SOIL SURVEY

Green County Wisconsin

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
in cooperation with
Wisconsin Agricultural Experiment Station
Issued June 1974

Major fieldwork for this soil survey was done in the period 1960–63. Soil names and descriptions were approved in 1967. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1963. This survey was made cooperatively by the Soil Conservation Service and Wisconsin Agricultural Experiment Station. It is part of the technical assistance furnished to the Green County Soil and Water Conservation District.

Either enlarged or reduced copies of the soil map in this publication can be made by commercial photographers, or they can be purchased on individual order from the Cartographic Division, Soil Conservation Service, United States Department of Agriculture, Washington, D.C. 20250.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY contains information that can be applied in managing farms, ranches, and woodlands; in selecting sites for roads, ponds, buildings, and other structures; and in judging the suitability of tracts of land for farming, industry, and recreation.

Locating Soils

All the soils of Green County are shown on the detailed map at the back of this publication. This map consists of many sheets made from aerial photographs. Each sheet is numbered to correspond with a number on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbols. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

The "Guide to Mapping Units" can be used to find information. This guide lists all the soils of the county in alphabetic order by map symbol and gives the capability classification of each. It also shows the page where each soil is described and the page for the woodland group and wildlife group in which the soil has been placed.

Individual colored maps showing the relative suitability or degree of limitation of soils for many specific purposes can be developed by using the soil map and the information in the text. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils from the section of that name and from the soil descriptions.

Foresters and others can refer to the section "Woodland," where the soils of the county are grouped according to their suitability for trees.

Game managers, sportsmen, and others can find information about soils and wildlife in the section "Use of the Soils for Wildlife."

Engineers and builders can find, under "Engineering Uses of the Soils," tables that contain test data, estimates of soil properties, and information about soil features that affect engineering practices.

Scientists and others can read about how the soils formed and how they are classified in the section "Formation and Classification of Soils."

Newcomers in Green County will be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the section "General Nature of the County."

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SOIL SURVEY OF GREEN COUNTY, WISCONSIN

BY CARL L. GLOCKER

FIELDWORK BY BUREL S. BUTMAN, CARL L. GLOCKER, S. MICHAEL SHIVERS, STUART W. TORRANCE, AND BRUCE G. WATSON,[1] SOIL CONSERVATION SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, IN COOPERATION WITH THE WISCONSIN AGRICULTURAL EXPERIMENT STATION

GREEN COUNTY is in southwestern Wisconsin (fig. 1). It is bounded on the south by the State of Illinois, on the north by Dane County, on the west by Lafayette County, and on the east by Rock County. The county has 16 civil townships. It has a total land area of 585 square miles, or 374,272 acres, and ranks 51st in size among the 72 counties in Wisconsin. Monroe, the county seat, is in the south-central part of the county.

Farming is the leading enterprise in the county, and more than half the people are on farms or are in related work. The others are engaged in merchandising, manufacturing, personal and professional services, and construction. Dairying, cheesemaking, and the raising of hogs are the chief enterprises on farms.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in Green County, where they are located, and how they can be used. The soil scientists went into the county knowing they likely would find many soils they had already seen and perhaps some they had not. They observed the steepness, length, and shape of slopes, the size and speed of streams, the kinds of native plants or crops, the kinds of rock, and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by the action of plant roots.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. The *soil series* and the *soil phase* are the categories of soil classification most used in the local survey.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Fayette and

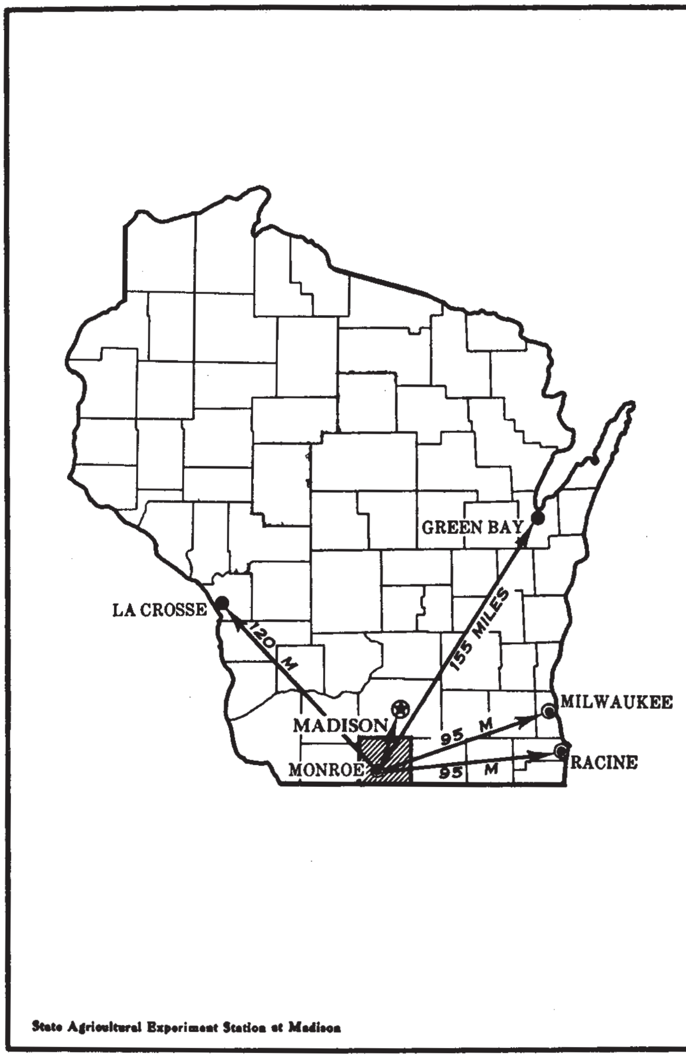

Figure 1.—Location of Green County in Wisconsin.

[1] Assisting with the fieldwork were FENTON GRAY, DELVIN S. FANNING, THEON KELLER, AUGUSTINE OTTER, JOHN SUND, JR., ROGER WEBER, and FRED C. WESTIN.

Gale, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that affect their behavior in the undisturbed landscape.

Soils of one series can differ in texture of the surface soil and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Palsgrove silt loam, 12 to 20 percent slopes, eroded, is one of several phases within the Palsgrove series.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, trees, and other details that help in drawing boundaries accurately. The soil map in the back of this publication was prepared from the aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning the management of farms and fields, a mapping unit is nearly equivalent to a soil phase. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil phase.

One undifferentiated group is shown on the map of Green County. It is made up of two or more soils that could be delineated individually but are shown as one unit because, for the purpose of the soil survey, there is little value in separating them. The pattern and proportion of soils are not uniform. An area shown on the map may be made up of only one of the dominant soils, or of two or more. The name of an undifferentiated group consists of the names of the dominant soils, joined by "and." Chaseburg and Arenzville silt loams is the undifferentiated group shown on the map.

In most areas surveyed there are places where the soil material is so rocky, so shallow, or so severely eroded that it cannot be classified by soil series. These places are shown on the soil map and are described in the survey, but they are called land types and are given descriptive names. Riverwash is a land type in Green County.

While a soil survey is in progress, samples of soils are taken, as needed, for laboratory measurements and for engineering tests. Laboratory data from the same kinds of soil in other places are assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil. Yields under defined management are estimated for all the soils.

But only part of a soil survey is done when the soils have been named, described, and delineated on the map, and the laboratory data and yield data have been assembled. The mass of detailed information then needs to be organized in such a way as to be readily useful to different groups of users, among them farmers, managers of woodland, and engineers.

On the basis of yield and practice tables and other data, the soil scientists set up trial groups. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others, then adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under present methods of use and management.

General Soil Map

The general soil map at the back of this survey shows, in color, the soil associations in Green County. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in a county, who want to compare different parts of a county, or who want to know the location of large tracts that are suitable for a certain kind of land use. Such a map is a useful general guide in managing a watershed, a wooded tract, or a wildlife area, or in planning engineering works, recreational facilities, and community developments. It is not a suitable map for planning the management of a farm or field, or for selecting the exact location of a road, building, or similar structure, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect their management.

The eight soil associations in Green County are discussed in the pages that follow and are shown on the colored map at the back of this survey. Soil associations and delineations on the general soil map do not fully agree with those of the general soil map in adjacent counties published at a different date. Differences in the maps are the result of improvement in the classification of soils, particularly in the modifications or refinements in soil series concepts. In addition, more precise and detailed maps are needed because the uses of the general soil maps have expanded in recent years. The more modern maps meet this need. Still another difference is the pattern of occurrence of the major soils or the range in slope that is permitted within associations in different surveys.

1. Dodgeville-Edmund Association

Moderately deep to shallow, nearly level to moderately steep soils that have a clayey subsoil; underlain by dolomite bedrock

This association is in the central and northwestern parts of the county. It consists of gently sloping to moderately steep soils on uplands and silty valley fill.

The association covers about 15 percent of the county. Dodgeville soils make up about 35 percent of the association and Edmund soils about 20 percent. About 45 percent of the association is minor soils.

Dodgeville and Edmund soils are on ridges. They are gently sloping to moderately steep soils that formed in 5 to 30 inches of windblown silt and clayey material weathered from dolomite. The surface layer in these soils is dark brown, very dark brown, or black. The subsoil is dark yellowish-brown silty clay loam in the upper part and dark-brown or reddish-brown silty clay or clay

in the lower part. Ground water is at a depth of more than 5 feet in these soils.

Minor soils in this association are in the Ashdale, Huntsville, Lindstrom, Otter, Sogn, and Tama series.

Most areas of this association are used either as cropland or pasture. Corn, oats, alfalfa, and bluegrass are the main crops. Shallow soils are especially suited to pasture grasses. Dairy farming and the raising of hogs are the chief enterprises. Uses of the soils in this association are limited by the shallow root zone, flooding in low areas, and limited available water capacity.

2. NewGlarus-Sogn Association

Moderately deep to shallow, gently sloping to moderately steep soils, some of which have a clayey subsoil; underlain by dolomite or sandstone

This association is mostly in the northern and western parts of the county. It consists of gently sloping to very steep soils on uplands and gently sloping soils made up of valley fill. Soils in this association are moderately deep to shallow over dolomite or sandstone.

This association occupies about 43 percent of the county. NewGlarus soils make up 30 percent of the association; Sogn soils, 10 percent; and minor soils, 60 percent.

NewGlarus soils have a surface layer of very dark grayish-brown to brown silt loam. The subsoil is yellowish-brown and reddish-brown silty clay loam to silty clay. Dolomite bedrock is at a depth of 10 to 40 inches.

Sogn soils have a surface layer of very dark brown silt loam, 4 to 10 inches thick. This layer is underlain by dolomite bedrock. Sogn soils are gently sloping to steep.

Minor soils of this association are in the Chaseburg, Hixton, Eleva, Elkmound, Orion, Fayette, and Palsgrove series.

Most gently sloping to moderately steep soils in this association are used as cropland or pasture. Areas of steeper soils are used as pasture or for timber. Dairying is the major enterprise. Erosion and runoff are major hazards, and they are the chief concerns of management.

3. Fayette-Tama Association

Deep, nearly level to sloping soils that have a silty subsoil and substratum; on benches in valleys

This association is west of the Sugar River, south of Albany, and west of Brodhead. It is on a high bench left by the glacial Sugar River as it meandered across the valley.

This association occupies about 3 percent of the county. Fayette soils make up about 35 percent of the association; Tama soils, about 30 percent; and minor soils, about 35 percent.

The Fayette soils have a surface layer of dark grayish-brown to brown silt loam and a subsoil of dark yellowish-brown silt loam to silty clay loam.

The Tama soils have a very dark brown or very dark grayish-brown surface layer, Their subsoil is brown to dark yellowish-brown silt loam to silty clay loam.

Minor soils in this association are Muscatine and Stronghurst soils on benches and soils of the Pillot, Tell, Lawler, and Otter series.

All of the soils in this association are used as cropland or pasture. They are among the most productive soils in the county. Corn, soybeans, and alfalfa are the major crops. Cash grain crops and dairy-hog raising enterprises are common. The main concerns in management are slight hazards of erosion and wetness.

4. Dunbarton-Whalan Association

Shallow and moderately deep, gently sloping to moderately steep soils that have a loamy and clayey subsoil over loam till; underlain by dolomite

This association is mostly in the southern one-third of the county on uplands and high benches. Slopes are gently sloping to moderately steep. Many different kinds of soils formed in many different kinds of material in this association. Except for major soils, however, the proportion of each individual soil is relatively small in respect to the overall association.

This association covers about 14 percent of the county. Dunbarton soils make up about 200 percent of the association; Whalan soils, about 10 percent; and minor soils, about 70 percent.

In Dunbarton soils the surface layer is dark grayish-brown silt loam, and the subsoil is dominantly clay. In Whalan soils the surface layer is very dark gray and very dark grayish-brown silt loam. The subsoil is dark-brown or brown silty clay loam or clay loam in the upper part and reddish-brown clay in the lower part. Depth to dolomite bedrock in Whalan soils is 20 to 40 inches. Whalan soils are gently sloping to steep. Ridges on which these soils are located are long and narrow.

Minor soils in this association include those of the Arenzville, Dakota, Dodgeville, Durand, Edmund, Meridian, Miami, NewGlarus, Orion, Pecatonica, Rockton, and Sogn series.

Most of the soils in this association are used for crops or pasture. A few wooded areas are on steeper sloping soils. Corn, oats, alfalfa, and soybeans are grown in soils of this association. Dairy-hog farming is the main enterprise. The hazards of erosion and runoff are the main concerns of management. Where these soils are over dolomite bedrock, their use is limited by a slightly lower available water capacity.

5. Hebron-Saylesville Association

Deep, nearly level to gently sloping soils that have a loamy and clayey subsoil and substratum; in basins that were formerly lakes

This association is on very low to high benches in old lake basins. It is mostly in the Sugar River valley east of Albany and north of Brodhead. Another very small area is southwest of Browntown.

This association occupies about 1 percent of the county. Hebron soils make up about 50 percent of the association; Saylesville soils, about 10 percent; and minor soils, about 40 percent.

In Hebron soils the surface layer is dark-gray silt loam. The subsoil is brown loam in the upper part, dark yellowish-brown sandy clay loam and dark-brown clay

loam in the middle part, and brown silty clay in the lower part. The substratum is yellowish-brown silty clay loam.

In Saylesville soils the surface layer is about 8 inches of dark-gray silt loam. The subsoil, about 24 inches thick, is brown silt loam in the upper part, dark yellowish-brown silty clay loam in the middle part, and dark-brown silty clay in the lower part. It is underlain by brown silty clay loam. Ground water is at a depth of 5 feet in some areas of Saylesville soils and 3 to 5 feet in others.

Minor soils in this association are in the Del Rey, Navan, and Colwood series. These soils have a high water table, and they are subject to flooding.

Most of the soils in this association are used for crops or pasture. Undrained wetlands are left idle or are used for limited pasture. Dairying is the major enterprise. Corn, oats, alfalfa, and clover are the main crops on these soils. The major hazards are erosion, high rates of runoff, flooding, and poor drainage. Management concerns and factors that limit the use of these soils are slow permeability, wetness in areas of poorly drained soils, limited root zones, moderate compressibility, and poor shear strength.

6. Orion-Huntsville-Ettrick Association

Deep, nearly level and gently sloping soils that are silty throughout; on flood plains and in low areas

This association is on low benches and bottoms in stream valleys throughout the county. The soils are subject to flooding.

The association covers about 14 percent of the county. Orion soils make up about 17 percent of the association; Huntsville soils, about 5 percent; and Ettrick soils, about 13 percent. About 55 percent of the association is minor soils.

Orion soils consist of 20 to 40 inches of recent alluvium over very dark colored older alluvium. The surface layer is about 8 inches of dark grayish-brown silt loam. It is underlain by grayish-brown to black silt loam. Ground water in Orion soils is at a depth of 1 to 3 feet in wet periods.

Huntsville soils are deep, very dark gray to black silt loams. They are on flood plains.

Ettrick soils formed in 36 inches or more of silty material. Their surface layer is about 13 inches of black silt loam, and their subsoil is olive-gray to dark-gray silty clay loam. These soils are underlain by loamy alluvium.

Minor soils of this association are in the Adrian, Arenzville, Dakota, Dickinson, Houghton, Marshan, Maumee, Meridian, Ossian, Otter, Palms, and Shiffer series.

Areas of these soils that are adequately drained or protected from flooding are used for cultivated crops. Undrained areas are left idle or are used for pasture. Corn and clover are the main crops. Undrained areas are well suited to wildlife habitat. Areas subject to flooding are used for pasture. The growing of cash grain crops and dairy farming are the main enterprises. Management concerns are poor drainage and the hazard of flooding. Use of these soils is limited by wetness in areas where the soils are poorly drained or where flooding is not controlled.

7. Durand-Myrtle-Rockton Association

Moderately deep and deep, gently sloping to moderately steep soils that have a loamy subsoil and substratum; on glaciated uplands

This association is in the southern part of the county on uplands and high benches. The soils are gently sloping to moderately steep. Natural vegetation is prairie grasses. Many different kinds of soil formed in many different kinds of material in this association. Except for major soils, however, the proportion of each individual soil is relatively small in respect to the overall association.

This association covers about 6 percent of the county. Durand soils make up about 20 percent of the association; Myrtle soils, about 9 percent; and Rockton soils, about 8 percent. About 63 percent of this association is minor soils.

In Durand soils a mantle of silt, 15 to 30 inches thick, is underlain by loamy glacial till. The thick surface layer of these soils is dark colored and silty. The subsoil is 15 to 20 inches of yellowish-brown and dark-brown silty clay loam and clay loam.

In Myrtle soils a mantle of silt, 30 to 40 inches or more thick, is underlain by deeply weathered loamy glacial till. The surface layer is moderately thick, moderately dark colored, silty material. Less silt is in the subsoil of Myrtle soils than in the subsoil of Durand soils, but otherwise the subsoil and underlying material of these two soils are similar.

Rockton soils are 20 to 40 inches deep. The thick, dark-colored surface layer of these soils is loamy or silty. The subsoil is 8 to 20 inches of dark-brown or dark yellowish-brown clay loam or sandy clay loam. It is underlain by dolomite bedrock.

Minor soils of this association are soils of the Edmund, Flagg, Griswold, Lamartine, Miami, Ogle, Pecatonica, Saybrook, and Winnebago series; soils of the Downs series that have a silty clay loam substratum; and soils of the Muscatine series that have a loamy substratum.

Most soils in this association are used for crops or pasture. A few areas of steeper sloping soils are wooded. Corn, oats, alfalfa, and soybeans are grown in these soils. Dairy-hog farming is the main enterprise. The main hazards are erosion and runoff. Use is limited in areas of these soils that are underlain by dolomite bedrock because of a slightly lower available water capacity.

8. Dickinson-Meridian Association

Deep, nearly level to sloping soils that have a loamy subsoil; underlain by outwash sand or sand and gravel

This association is on benches of Sugar River, Allen Creek, Story Creek, and Little Sugar River. Slopes are dominantly nearly level and gently sloping.

The association occupies about 4 percent of the county. Dickinson soils make up about 25 percent of it; Meridian soils, about 19 percent; and minor soils, about 56 percent.

In Dickinson soils the surface layer is thick, dark-colored sandy loam, and the subsoil is dark yellowish-brown sandy loam or sandy clay loam. The underlying sandy outwash is yellowish brown in color. Reaction of this material is medium acid. Ground water is at a depth of 5 feet or more in Dickinson soils.

The deep Meridian soils have a surface layer that is thin and light colored. Their subsoil is loamy, and it is brown or yellowish brown in color. Reaction of the underlying yellowish-brown sand outwash is medium acid. Ground water is at a depth of 5 feet or more in these soils.

Minor soils in this association are in the Billet, Dakota, Fox, Lawler, Marshan, Matherton, Maumee, Ockley, Shiffer, and Thackery series. Most Fox, Matherton, Ockley, and Thackery soils are on benches in the Story Creek valley between Belleville and Brooklyn. These four soils are underlain, at a depth of 20 to 60 inches, by calcareous sand and gravel outwash.

Most of the soils in this association are used for cultivated crops or pasture. In places trees have been planted in very sandy areas. Corn, oats, and alfalfa are the main crops. Dairying and growing cash grain crops are the main enterprises. Wind erosion is a major hazard on this soil. Use of these soils is limited by restricted root zones, low available water capacity, and, in some areas, shallow depth to the seasonal high water table.

Descriptions of the Soils

This section describes the soil series and mapping units in Green County. Each soil series is described in considerable detail, and then, briefly, each mapping unit in that series. Unless it is specifically mentioned otherwise, it is to be assumed that what is stated about the soil series holds true for the mapping units in that series. Thus, to get full information about any one mapping unit, it is necessary to read both the description of the mapping unit and the description of the soil series to which it belongs.

An important part of the description of each soil series is the soil profile, that is, the sequence of layers from the surface downward to rock or other underlying material. Each series contains two descriptions of this profile. The first is brief and in terms familiar to the layman. The second, detailed and in technical terms, is for scientists, engineers, and others who need to make thorough and precise studies of soils. Unless it is otherwise stated, the colors given in the descriptions are those of a moist soil, and consistence is for a moist soil.

As mentioned in the section "How This Survey Was Made," not all mapping units are members of a soil series. Riverwash, for example, does not belong to a soil series, but nevertheless is listed in alphabetic order along with the soil series.

Following the name of each mapping unit is a symbol in parentheses. This symbol identifies the mapping unit on the detailed soil map. Listed at the end of each description of a mapping unit is the capability unit, woodland group, and wildlife group in which the mapping unit has been placed. The page for description of each capability unit, woodland group, or wildlife group can be found by referring to the "Guide to Mapping Units" at the back of this survey.

The acreage and proportionate extent of each mapping unit are shown in table 1. Many of the terms used in describing soils can be found in the Glossary at the end of the survey, and more detailed information about the terminology and methods of soil mapping can be obtained from the Soil Survey Manual (*4*).[2]

A given soil series in this county may be identified by a different name in a recently published soil survey of an adjacent county. Such differences in name result from changes in the concepts of soil classification that have occurred since publication. The characteristics of the soil series described in this county are considered to be within the range defined for that series. In those instances where a soil series has one or more features outside the defined range, the differences are explained.

Adrian Series

Soils of the Adrian series are deep, poorly drained, and nearly level. They formed in 20 to 40 inches of accumulated residue of sedges underlain by medium sand to a depth of 5 feet or more. Ground water is on or near the surface of these soils most of the time.

In a representative profile the surface layer is black muck about 8 inches thick. It is underlain by about 18 inches of matted, very dark brown and black mucky peat. Below a depth of 26 inches is grayish-brown sand that is single grained.

Natural fertility is medium to low in these soils, and available water capacity is high. Reaction is neutral to a depth of 26 inches and mildly alkaline below.

If these soils are drained, they can be used for row crops, small grains, and hay. They have good potential for wildlife habitat.

In areas of Adrian soils that are drained and cultivated, the soil material blows readily. Open ditches can be used to provide drainage. Controlling the water table helps to prevent excessive oxidation and subsidence. Excessive subsidence reduces the thickness of the organic part of the soil and the depth to undesirable sand below.

Representative profile of Adrian muck in a cultivated field (NW¼SW¼ sec. 7, T. 4 N., R. 9 E.):

Oa1—0 to 8 inches, black (N 2/0) muck; weak, fine, subangular blocky structure; friable; moderately alkaline; clear, smooth boundary.

Oa2—8 to 17 inches, very dark brown (10YR 2/2) mucky peat; matted; neutral; clear, smooth boundary.

Oa3—17 to 26 inches, black (10YR 2/1) mucky peat; matted; friable; neutral; diffuse, smooth boundary.

IIC—26 to 60 inches, grayish-brown (2.5Y 5/2) sand; single grained; very friable; mildly alkaline.

The organic horizons range from 20 to 40 inches in thickness. Texture of the Oa2 and Oa3 horizons ranges from muck to mucky peat. Color ranges from black (10YR 2/1) to very dark grayish brown (10YR 3/2) throughout the profile. In places the underlying material is loamy sand or gravelly sand. Thickness of the solum ranges from 20 to 40 inches.

Adrian soils are near Marshan, Maumee, and Sebewa soils. They formed in material similar to that of Houghton and Palms soils, but they are thinner over sand than Houghton soils. Adrian soils are underlain by sand, unlike Palms soils which are underlain by loamy material.

Adrian muck (0 to 2 percent slopes) (Ac).—This is the only Adrian soil mapped in the county. It is on low bottoms or benches in valleys of streams. The areas are 5 to 40 acres in size and are irregular in shape. The surface layer is black in drained areas that are cultivated, but it is very dark brown in undrained areas. Texture of the surface layer varies slightly within the same mapped

[2] Italic numbers in parentheses refer to Literature cited, page 158.

TABLE 1.—*Approximate acreage and proportionate extent of the soils*

Soil	Area	Extent	Soil	Area	Extent
	Acres	*Percent*		*Acres*	*Percent*
Adrian muck	272	(1)	Elkmound sandy loam, 6 to 12 percent slopes, eroded	1, 450	. 4
Alluvial land	1, 900	0. 5	Elkmound sandy loam, 12 to 20 percent slopes, eroded	4, 702	1. 3
Alluvial land, wet	1, 915	. 5	Elkmound sandy loam, 20 to 30 percent slopes, eroded	1, 071	. 3
Arenzville silt loam	4, 101	1. 1	Elkmound sandy loam, 30 to 45 percent slopes	1, 388	. 4
Arland loam, warm variant, 2 to 6 percent slopes, eroded	1, 005	. 3	Ettrick silt loam	7, 076	1. 9
Arland loam, warm variant, 6 to 12 percent slopes, eroded	677	. 1	Fayette silt loam, 2 to 6 percent slopes, eroded	1, 429	. 4
Arland loam, warm variant, 12 to 20 percent slopes, eroded	182	(1)	Fayette silt loam, 6 to 12 percent slopes, eroded	1, 235	. 3
Ashdale silt loam, 2 to 6 percent slopes, eroded	3, 953	1. 0	Fayette silt loam, 12 to 20 percent slopes, eroded	443	. 1
Ashdale silt loam, 6 to 12 percent slopes, eroded	2, 359	. 6	Fayette silt loam, benches, 0 to 2 percent slopes	797	. 2
Ashdale silt loam, 12 to 20 percent slopes, eroded	10, 789	3. 1	Fayette silt loam, benches, 2 to 6 percent slopes, eroded	3, 578	1. 0
Billett sandy loam, 0 to 2 percent slopes	558	. 2	Fayette silt loam, benches, 6 to 12 percent slopes	471	. 1
Billett sandy loam, 2 to 6 percent slopes, eroded	1, 125	. 3	Fayette silt loam, loamy substratum, 2 to 6 percent slopes, eroded	2, 433	. 7
Billett sandy loam, 6 to 12 percent slopes, eroded	134	(1)	Fayette silt loam, loamy substratum, 6 to 12 percent slopes, eroded	761	. 2
Boone fine sand, 2 to 20 percent slopes	234	(1)	Fayette silt loam, loamy substratum, 12 to 20 percent slopes, eroded	787	. 2
Brookston silt loam	710	. 1	Fayette silt loam, valleys, 6 to 12 percent slopes, eroded	670	. 2
Cadiz silt loam, 2 to 6 percent slopes, eroded	754	. 2	Fayette silt loam, valleys, 12 to 20 percent slopes, eroded	871	. 2
Cadiz silt loam, 6 to 12 percent slopes, eroded	1, 695	. 4	Flagg silt loam, 0 to 2 percent slopes	312	(1)
Chaseburg silt loam, 2 to 6 percent slopes	4, 301	1. 1	Flagg silt loam, 2 to 6 percent slopes, eroded	2, 332	. 6
Chaseburg silt loam, 6 to 12 percent slopes	110	(1)	Flagg silt loam, 6 to 12 percent slopes, eroded	1, 085	. 3
Chaseburg and Arenzville silt loams	1, 741	. 5	Fox loam, 0 to 2 percent slopes	378	. 1
Colwood silt loam	214	(1)	Fox loam, 2 to 6 percent slopes, eroded	787	. 2
Dakota loam, 0 to 2 percent slopes	1, 210	. 3	Fox loam, 6 to 12 percent slopes, eroded	550	. 1
Dakota loam, 2 to 6 percent slopes, eroded	481	. 1	Fox sandy loam, 6 to 12 percent slopes, eroded	252	(1)
Dells silt loam, 0 to 3 percent slopes	1, 139	. 3	Fox sandy loam, 12 to 20 percent slopes, eroded	228	(1)
Del Rey silt loam	458	. 1	Fox silt loam, 0 to 2 percent slopes	433	. 1
Dickinson sandy loam, 1 to 3 percent slopes	3, 459	1. 0	Fox silt loam, 2 to 6 percent slopes, eroded	836	. 2
Dodge silt loam, 2 to 6 percent slopes, eroded	856	. 2	Gale silt loam, 2 to 6 percent slopes, eroded	1, 630	. 4
Dodge silt loam, 6 to 12 percent slopes, eroded	329	. 1	Gale silt loam, 6 to 12 percent slopes, eroded	1, 948	. 6
Dodgeville silt loam, 2 to 6 percent slopes, eroded	3, 369	. 9	Gale silt loam, 12 to 20 percent slopes, eroded	1, 262	. 3
Dodgeville silt loam, 6 to 12 percent slopes, eroded	11, 053	3. 2	Gale silt loam, 20 to 30 percent slopes, eroded	221	(1)
Dodgeville silt loam, 6 to 12 percent slopes, severely eroded	335	(1)	Gotham loamy sand, 0 to 2 percent slopes	290	(1)
Dodgeville silt loam, 12 to 20 percent slopes, eroded	6, 518	1. 7	Gotham loamy sand, 2 to 6 percent slopes, eroded	987	. 3
Downs silt loam, 2 to 6 percent slopes, eroded	1, 585	. 4	Gotham loamy sand, 6 to 12 percent slopes, eroded	333	(1)
Downs silt loam, 6 to 12 percent slopes, eroded	817	. 2	Griswold silt loam, 2 to 6 percent slopes, eroded	453	. 1
Downs silt loam, heavy substratum, 0 to 2 percent slopes	327	(1)	Griswold silt loam, 6 to 12 percent slopes, eroded	1, 009	. 3
Downs silt loam, heavy substratum, 2 to 6 percent slopes	2, 522	. 7	Hebron silt loam, 0 to 2 percent slopes	176	(1)
Downs silt loam, heavy substratum, 2 to 6 percent slopes, eroded	1, 763	. 5	Hebron silt loam, 2 to 6 percent slopes, eroded	938	. 3
Downs silt loam, heavy substratum, 6 to 12 percent slopes, eroded	1, 097	. 3	Hebron silt loam, mottled subsoil variant, 0 to 3 percent slopes	864	. 2
Dunbarton silt loam, 2 to 6 percent slopes, eroded	520	. 1	Hixton loam, 2 to 6 percent slopes, eroded	564	. 2
Dunbarton silt loam, 6 to 12 percent slopes, eroded	7, 354	2. 0	Hixton loam, 6 to 12 percent slopes, eroded	812	. 2
Dunbarton silt loam, 12 to 20 percent slopes, eroded	7, 541	2. 2	Houghton mucky peat	2, 546	. 7
Dunbarton silt loam, 20 to 30 percent slopes, eroded	754	. 2	Huntsville silt loam, 0 to 2 percent slopes	2, 720	. 8
Dunbarton silty clay loam, 10 to 20 percent slopes, severely eroded	571	. 2	Huntsville silt loam, 2 to 6 percent slopes	5, 045	1. 5
Durand silt loam, 2 to 6 percent slopes, eroded	2, 585	. 7	Juda silt loam, 2 to 6 percent slopes, eroded	1, 296	. 3
Durand silt loam, 6 to 12 percent slopes, eroded	2, 427	. 6	Juda silt loam, 6 to 12 percent slopes, eroded	2, 056	. 5
Edmund silt loam, 2 to 6 percent slopes, eroded	1, 272	. 3	Lamartine silt loam, 1 to 6 percent slopes	543	. 1
Edmund silt loam, 6 to 12 percent slopes, eroded	7, 929	2. 3	Lawler loam, 0 to 2 percent slopes	568	. 2
Edmund silt loam, 12 to 20 percent slopes, eroded	4, 023	1. 1	Lawler silt loam, 0 to 3 percent slopes	723	. 2
Eleva sandy loam, 6 to 12 percent slopes, eroded	642	. 2	Lindstrom sandy loam, 6 to 12 percent slopes, eroded	246	(1)
Eleva sandy loam, 12 to 20 percent slopes, eroded	1, 098	. 3	Lindstrom sandy loam, 12 to 20 percent slopes, eroded	395	. 1
Elkmound sandy loam, 2 to 6 percent slopes, eroded	715	. 2	Lindstrom silt loam, 6 to 12 percent slopes	1, 283	. 4
			Lindstrom silt loam, 12 to 20 percent slopes, eroded	586	. 2
			Marshan loam	1, 154	. 3

See footnotes at end of table.

TABLE 1.—*Approximate acreage and proportionate extent of the soils*—Continued

Soil	Area	Extent
	Acres	*Percent*
Marshan silt loam	3, 520	1. 3
Matherton silt loam	1, 081	.
Maumee sandy loam	258	(1) 3
Meridian loam, 0 to 2 percent slopes	1, 027	. 0
Meridian loam, 2 to 6 percent slopes, eroded	1, 313	. 4
Meridian loam, 6 to 12 percent slopes, eroded	268	(1)
Miami silt loam, 2 to 6 percent slopes, eroded	1, 007	. 3
Miami silt loam, 6 to 12 percent slopes, eroded	1, 213	. 3
Miami silt loam, 12 to 20 percent slopes, eroded	874	. 2
Mifflin loam, 6 to 12 percent slopes, eroded	1, 273	. 3
Mifflin loam, 12 to 20 percent slopes, eroded	521	. 1
Mifflin loam, shallow solum variant, 6 to 12 percent slopes, eroded	110	(1)
Mifflin loam, shallow solum variant, 12 to 20 percent slopes, eroded	911	. 2
Morley silt loam, 2 to 6 percent slopes, eroded	183	(1)
Morley silt loam, 6 to 12 percent slopes, eroded	330	(1)
Morley silt loam, 12 to 20 percent slopes, eroded	260	(1)
Muscatine silt loam, 2 to 6 percent slopes, eroded	259	(1)
Muscatine silt loam, benches, 0 to 3 percent slopes	3, 214	. 9
Muscatine silt loam, loamy substratum, 0 to 3 percent slopes	1, 195	. 3
Myrtle silt loam, 2 to 6 percent slopes, eroded	2, 199	. 6
Myrtle silt loam, 6 to 12 percent slopes, eroded	367	. 1
Navan silt loam	458	. 1
NewGlarus silt loam, 2 to 6 percent slopes, eroded	4, 031	1. 0
NewGlarus silt loam, 6 to 12 percent slopes, eroded	23, 178	6. 9
NewGlarus silt loam, 12 to 20 percent slopes, eroded	21, 180	6. 4
NewGlarus silt loam, 20 to 30 percent slopes, eroded	3, 078	. 8
NewGlarus soils, 6 to 12 percent slopes, severely eroded	335	(1)
NewGlarus soils, 12 to 20 percent slopes, severely eroded	3, 370	. 9
Northfield loam, 2 to 6 percent slopes, eroded	536	. 1
Northfield loam, 6 to 12 percent slopes, eroded	893	. 2
Northfield loam, 12 to 20 percent slopes, eroded	1, 131	. 3
Northfield loam, 20 to 30 percent slopes, eroded	831	. 2
Ockley loam, 0 to 2 percent slopes	1, 485	. 4
Ockley loam, 2 to 6 percent slopes	1, 265	. 3
Ockley sandy loam, 0 to 3 percent slopes	807	. 2
Ockley silt loam, 0 to 2 percent slopes	377	. 1
Ockley silt loam, 2 to 6 percent slopes, eroded	708	. 2
Ockley silt loam, 6 to 12 percent slopes, eroded	242	(1)
Ogle silt loam, 2 to 6 percent slopes, eroded	1, 116	. 3
Ogle silt loam, 6 to 12 percent slopes, eroded	386	. 1
Orion silt loam, 0 to 3 percent slopes	8, 365	2. 3
Orion silt loam, wet variant	705	. 2
Oshtemo loamy sand, 0 to 2 percent slopes	586	. 2
Oshtemo loamy sand, 2 to 6 percent slopes, eroded	831	. 2
Oshtemo loamy sand, 6 to 12 percent slopes, eroded	261	(1)
Ossian silt loam	5, 074	1. 4
Otter silt loam	3, 733	1. 0
Palms muck	2, 920	. 8
Palsgrove silt loam, 2 to 6 percent slopes, eroded	2, 634	. 7
Palsgrove silt loam, 6 to 12 percent slopes, eroded	3, 128	. 8
Palsgrove silt loam, 12 to 20 percent slopes, eroded	2, 701	. 7
Palsgrove silty clay loam, 12 to 20 percent slopes, severely eroded	268	(1)
Pecatonica silt loam, 2 to 6 percent slopes, eroded	2, 483	. 7
Pecatonica silt loam, 6 to 12 percent slopes, eroded	2, 001	. 6
Pecatonica silt loam, 12 to 20 percent slopes, eroded	190	(1)
Pillot silt loam, 0 to 2 percent slopes	127	(1)
Pillot silt loam, 2 to 6 percent slopes, eroded	407	. 1
Pillot silt loam, 6 to 12 percent slopes, eroded	405	. 1
Plainfield loamy sand, 0 to 6 percent slopes, eroded	369	. 1
Riverwash	112	(1)
Rockton loam, 6 to 12 percent slopes, eroded	230	(1)
Rockton loam, 12 to 20 percent slopes, eroded	73	(1)
Rockton silt loam, 2 to 6 percent slopes, eroded	557	. 1
Rockton silt loam, 6 to 12 percent slopes, eroded	1, 091	. 3
Rodman gravelly loam, 2 to 12 percent slopes	102	(1)
Rodman gravelly loam, 12 to 30 percent slopes	295	(1)
Saybrook silt loam, 2 to 6 percent slopes, eroded	374	. 1
Saybrook silt loam, 6 to 12 percent slopes, eroded	371	. 1
Saylesville silt loam, 2 to 6 percent slopes, eroded	349	(1)
Sebewa silt loam	3, 711	1. 0
Shiffer loam, 0 to 3 percent slopes	1, 183	. 3
Sogn silt loam, 2 to 12 percent slopes	4, 882	1. 4
Sogn silt loam, 12 to 30 percent slopes	15, 134	4. 1
Steep stony and rocky land	8, 471	2. 4
Stronghurst silt loam, 2 to 6 percent slopes	122	(1)
Stronghurst silt loam, benches, 0 to 3 percent slopes	3, 475	. 9
Stronghurst silt loam, loamy substratum, 0 to 3 percent slopes	1, 805	. 5
Sylvester silt loam, 2 to 6 percent slopes, eroded	2, 143	. 6
Sylvester silt loam, 6 to 12 percent slopes, eroded	1, 281	. 3
Tama silt loam, 2 to 6 percent slopes, eroded	4, 883	1. 3
Tama silt loam, 6 to 12 percent slopes, eroded	379	. 1
Tama silt loam, benches, 0 to 2 percent slopes	2, 154	. 6
Tama silt loam, benches, 2 to 6 percent slopes	1, 184	. 3
Tell silt loam, 0 to 2 percent slopes	556	. 1
Tell silt loam, 2 to 6 percent slopes, eroded	985	. 3
Tell silt loam, 6 to 12 percent slopes, eroded	238	(1)
Terrace escarpments	594	. 2
Thackery silt loam, 0 to 3 percent slopes	882	. 2
Wallkill silt loam	379	. 1
Westville loam, 6 to 12 percent slopes, eroded	569	. 1
Westville silt loam, 2 to 6 percent slopes, eroded	847	. 2
Westville silt loam, 6 to 12 percent slopes, eroded	530	. 1
Westville silt loam, 12 to 20 percent slopes, eroded	513	. 1
Whalan loam, 2 to 6 percent slopes, eroded	557	. 1
Whalan loam, 6 to 12 percent slopes, eroded	778	. 2
Whalan silt loam, 2 to 6 percent slopes, eroded	1, 595	. 4
Whalan silt loam, 6 to 12 percent slopes, eroded	4, 758	1. 3
Whalan silt loam, 12 to 20 percent slopes, eroded	838	. 2
Winnebago silt loam, 2 to 6 percent slopes, eroded	264	(1)
Winnebago silt loam, 6 to 12 percent slopes, eroded	569	. 2
Total	374, 272	100. 0

[1] Less than 0.1 percent.

area, depending on the degree of disintegration of the organic soil and the amount of mineral soil deposited by floodwater.

Included with this soil in mapping are some small areas where slopes are 2 to 6 percent. Also included are small areas of Houghton soils.

If this soil is adequately drained, it is suited to row crops. Undrained areas are better suited to limited pasture or wildlife habitat than to other uses.

The chief concerns of management are providing adequate drainage, controlling soil blowing, reducing subsidence, and raising the level of fertility. Capability unit IVw-7; woodland group 10; wildlife group 6.

Alluvial Land

Alluvial land (0 to 2 percent slopes) (Ad) consists of soils formed in stratified material that varies in texture and sequence from place to place. The surface layer ranges from sand and gravel to silt loam in texture.

Included with this land in mapping are areas of Riverwash and other land types less than 1 acre in size. Also included are small areas of such soils as Otter and Orion.

Natural fertility and available water capacity are moderate in this land type. The water table generally is at a depth of 3 to 6 feet. Flooding occurs in places, mainly in spring. Reaction is nearly neutral.

Areas of Alluvial land are suitable for crops that mature late in the growing season. Most crops common to the county can be grown in areas that are protected from flooding. Many areas of this land type are in pasture or are wooded. Capability unit IIw-13; woodland group 9; wildlife group 7.

Alluvial Land, Wet

Alluvial land, wet (0 to 2 percent slopes) (Ae), consists of soils formed in sandy and loamy sediment deposited by streams. It is on the lower parts of flood plains adjacent to major streams (fig. 2).

The surface layer ranges from gravelly sand to loam. Below is stratified loam, silt, sand, and gravel.

Included with this land type in mapping are areas of Riverwash and other land types that are less than 1 acre in size. Also included are small areas of Otter silt loam and of Orion silt loam, wet variant.

Natural fertility is moderate in this land type. The water table generally is at a depth of less than 2 feet, and the areas are flooded frequently. Reaction is nearly neutral.

Alluvial land, wet, is not suited to crops because of the high water table and severe hazard of flooding. It is well suited to pasture, woodland, and wildlife habitat, and most areas are in pasture or are wooded. Capability unit Vw-14; woodland group 9; wildlife group 5b.

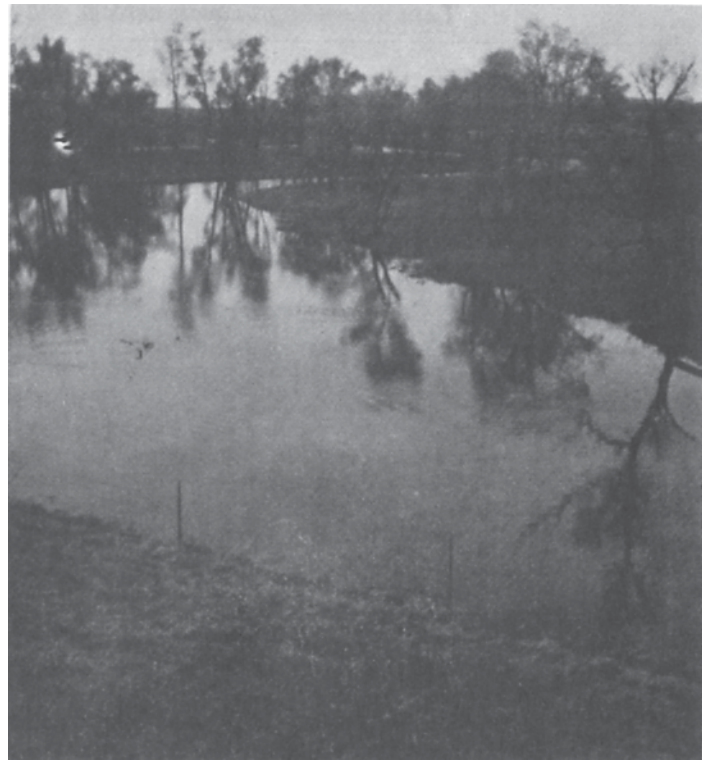

Figure 2.—Area of Alluvial land, wet.

Arenzville Series

The Arenzville series consists of deep, moderately well drained and well drained soils on flood plains. They are on natural levees along most of the perennial and intermittent streams in the county. Ground water generally is at a depth of more than 5 feet throughout the year, but in some places it is at a depth of 3 to 5 feet in wet seasons. Arenzville soils formed in moderately deep, recent, silty alluvium and older buried alluvium. The recent alluvium washed down from uplands that originally were covered by mixed hardwoods.

In a representative profile the surface layer is dark grayish-brown silt loam about 23 inches thick. The buried soil is very dark gray silt loam to a depth of 32 inches and black silt loam below. It extends to a depth of about 60 inches. Mottles in the buried soil are dark brown.

Natural fertility and available water capacity are high in Arenzville soils. Permeability is moderate. Reaction is neutral throughout the profile.

In most areas these soils are subject to frequent flooding and to streambank erosion. The water table generally is at too great a depth to interfere with root development.

If these soils are protected from flooding, they are well suited to corn, small grains, grasses, and legumes. Inaccessible areas or areas that are flooded frequently are better suited to permanent pasture, woodland, or wildlife habitat than to other uses. The chief concerns of management are improving tilth and content of organic matter, controlling flooding, controlling streambank erosion, and keeping fertility high.

Representative profile of Arenzville silt loam in an undisturbed area (SE¼NW¼ sec. 19, T. 1 N., R. 8 E.):

A11—0 to 23 inches, dark grayish-brown (10YR 4/2) silt loam; weak, thin, platy structure; friable; neutral; abrupt, wavy boundary.

A12b—23 to 32 inches, very dark gray (10YR 3/1) silt loam; moderate, very fine, subangular blocky structure; friable; neutral.

A13b—32 to 60 inches, black (10YR 2/1) silt loam; common, fine, prominent, dark-brown (7.5YR 4/4) mottles;

moderate, very fine, subangular blocky structure; friable; neutral.

The recent silty overburden that overlies the buried soil ranges from 20 to 40 inches in thickness. Mottling in the A13b horizon ranges from reddish brown to dark brown. In places thin layers of fine sand are in the upper part of the buried soil.

Arenzville soils are lighter colored than Huntsville soils, which are similar in texture and occupy similar positions in the landscape. They are more stratified than Chaseburg soils, and they have a buried soil which is lacking in Chaseburg soils. Arenzville soils are moderately well drained and well drained, unlike the associated Orion soils, which are somewhat poorly drained.

Arenzville silt loam (0 to 2 percent slopes) (An).—This is the only Arenzville soil mapped in the county. Included in mapping are areas where the surface layer is slightly darker than that in the profile described as representative of the series. Also included, in depressions where water collects, are small areas of Orion soils. The soil dries slowly in these areas, and tillage is delayed in spring.

If this soil is well managed, it is suited to row crops, small grains, and hay. Flooding is a moderate hazard, and in places streambank erosion is a hazard. Other management concerns are improving tilth, maintaining fertility, and maintaining content of organic matter. Capability unit IIw–11; woodland group 1; wildlife group 7.

Arland Series, Warm Variants

These variants from the normal Arland soils are moderately deep and well drained. They occupy areas below Whalan soils in the landscape and above Steep stony and rocky land. They formed partly in glacial till 20 to 40 inches thick and partly in a thin layer of sand over sandstone.

In a representative profile the surface layer is about 4 inches of very dark grayish-brown loam, and the subsurface layer is about 4 inches of grayish-brown loam. The subsoil, about 22 inches thick, is yellowish-brown loam in the upper part and dark-brown sandy clay loam and loam in the lower part. The underlying sandstone is pale brown to reddish brown in color.

Natural fertility, available water capacity, and permeability are moderate in these soils. The root zone is less than 40 inches deep.

These soils are suited to most crops commonly grown in the county. The main crops are corn, oats, and alfalfa. The soils are also suited to pasture, trees, and wildlife habitat.

If these soils are cultivated, contour stripcropping, diversions, terraces, and grassed waterways are needed to help to control erosion. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure are other helpful practices.

Representative profile of Arland loam, warm variant, 6 to 12 percent slopes, eroded, in an undisturbed area (NE¼SE¼ sec. 1, T. 3 N., R. 9 E.):

A1—0 to 4 inches, very dark grayish-brown (10YR 3/2 heavy loam; weak, medium, granular structure; friable; moderately alkaline; clear, wavy boundary.

A2—4 to 8 inches, grayish-brown (10YR 5/2) loam; weak, thin, platy structure; friable; mildly alkaline; clear, wavy boundary.

B1—8 to 11 inches, yellowish-brown (10YR 5/4) loam; moderate, fine, subangular blocky structure; friable; slightly acid; clear, wavy boundary.

B21t—11 to 19 inches, dark-brown (7.5YR 4/4) sandy clay loam; moderate, medium, subangular blocky structure; firm; thin discontinuous clay films; a few glacial pebbles; slightly acid; clear, wavy boundary.

B22t—19 to 23 inches, brown (7.5YR 5/4) heavy loam; moderate, medium, subangular blocky structure; friable; thin discontinuous clay films; a few glacial pebbles; slightly acid; clear, wavy boundary.

IIB3—23 to 30 inches, yellowish-brown (10YR 5/4) loamy sand; weak, medium, subangular blocky structure; very friable; medium acid; clear, wavy boundary.

IIR—30 to 60 inches, weakly cemented sandstone.

The Ap horizon, where present, ranges from 6 to 8 inches in thickness and from very dark grayish brown (10YR 3/2) to brown (10YR 4/3) in color. In places the A2 horizon has been mixed with the Ap by plowing. The solum ranges from 20 to 40 inches in thickness. In some areas the B3 horizon is strongly acid, and the underlying sandstone is strongly cemented.

Arland soils are near Hixton, Northfield, and Sylvester soils. Their subsoil has more glacial material than that in the Hixton soils. They are deeper to sandstone bedrock than Northfield soils and have a finer textured subsoil. Arland soils have a thinner, lighter colored, and coarser textured surface layer than that in Sylvester soils.

Arland loam, warm variant, 2 to 6 percent slopes, eroded (ArB2).—This soil is on ridgetops and adjacent slopes of glaciated uplands. Slopes are about 150 feet long. The plow layer in cultivated areas is dark grayish brown or dark brown. This soil has a thicker solum than that in the profile described as representative of the series. It also is less susceptible to erosion.

Included with this soil in mapping are areas of Hixton soils and areas where the soils have a thin mantle of silt.

Tilth is better in those areas of this soil that are not eroded, and the content of organic matter is greater in those areas. The surface crusts more easily in eroded areas, and the rate of runoff is increased where the surface is crusted.

This soil is suited to row crops, small grains, and hay. Practices that control erosion are needed. Because of the limited water capacity, practices also are needed that help to conserve a maximum amount of the rainfall. Capability unit IIe–2; woodland group 1; wildlife group 1.

Arland loam, warm variant, 6 to 12 percent slopes, eroded (ArC2).—This soil has the profile described as representative of the series. It is in long, narrow areas on middle and lower parts of slopes on uplands underlain by bedrock. In undisturbed areas the surface layer is dark grayish brown, and in cultivated and eroded areas the plow layer is dark brown where part of the subsoil has been mixed with the plow layer.

Included with this soil in mapping are a few small areas of Northfield loam and small areas where erosion is severe. Also included are small areas where the surface layer is silt loam. The Northfield loam has low available water capacity, and it generally is poorly suited to crops. In areas where erosion is severe, cultivation is difficult, tilth is poor, and the content of organic matter in the soil is low.

If this Arland soil is managed properly, it is suited to row crops, small grains, and hay. The severe hazard of further erosion and the medium available water capacity limit use of this soil. Capability unit IIIe–2; woodland group 1; wildlife group 1.

Arland loam, warm variant, 12 to 20 percent slopes, eroded (ArD2).—This soil is in long, narrow areas on lower parts of slopes on uplands underlain by bedrock. Slopes are 50 to 100 feet long. In cultivated areas the surface layer is dark grayish brown or dark brown.

The profile of this soil is similar to that described as representative of the series, but in cultivated areas the solum is slightly thinner. Also, this soil is more susceptible to erosion. Sandstone bedrock is at a depth of 20 to 26 inches, except in areas of this soil that are not eroded.

Included with this soil in mapping are small areas of Northfield loam. Available water capacity is low in the Northfield soils, and the included areas generally are poorly suited to crops.

This soil is suited to small grains, forage crops, trees, and wildlife habitat. The main concerns of management are the severe hazard of further erosion and the limited thickness of the soil over bedrock. Erosion can be controlled and moisture can be conserved if the soil is managed carefully. Runoff on the moderately steep slopes and a reduced infiltration rate cause loss of large amounts of rainfall and increase the hazard of erosion. Capability unit IVe-2; woodland group 1; wildlife group 1.

Ashdale Series

The Ashdale series consists of deep, well-drained soils that are underlain by dolomitic bedrock. These soils are on ridgetops and the upper parts of slopes in unglaciated uplands. Ground water is at a depth of more than 5 feet throughout the year. Ashdale soils formed in 36 to 50 inches of wind-laid silt underlain by clay weathered from dolomite. Prairie grasses are the native vegetation on these soils.

In a representative profile the plow layer is about 9 inches of black silt loam, and the subsurface layer is about 6 inches of very dark grayish-brown silt loam. The subsoil, about 32 inches thick, is brown and yellowish-brown silt loam in the upper part and yellowish-brown silty clay loam and silt loam in the middle part. Reaction in the middle part is strongly acid and medium acid. The lower part of the subsoil is reddish-brown clay. It is underlain by dolomitic bedrock.

These soils are in good tilth. Fertility and content of organic matter are high. Available moisture capacity is high, and permeability is moderate.

Ashdale soils are well suited to crops. Contour stripcropping, diversions, terraces, and grassed waterways are needed to help control erosion. Other helpful practices are keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure.

Representative profile of Ashdale silt loam, 2 to 6 percent slopes, eroded, in a cultivated field (NE¼NW¼ sec. 32, T. 1 N., R. 7 E.):

Ap—0 to 9 inches, black (10YR 2/1) silt loam; weak, fine, granular structure; friable; moderately alkaline; clear, wavy boundary.

A3—9 to 15 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, medium, granular structure; friable; slightly acid; clear, wavy boundary.

B11—15 to 19 inches, dark yellowish-brown (10YR 3/4) silt loam; moderate, fine, subangular blocky structure; friable; strongly acid; gradual, wavy boundary.

B12—19 to 25 inches, brown (10YR 4/3) silt loam; moderate, very fine, subangular blocky structure; friable; strongly acid; clear, wavy boundary.

B21t—25 to 30 inches, yellowish-brown (10YR 5/4) light silty clay loam; moderate, medium, subangular blocky structure; friable; thin discontinuous clay films; strongly acid; gradual, wavy boundary.

B22t—30 to 33 inches, yellowish-brown (10YR 5/4) silty clay loam; moderate, fine, subangular blocky structure; firm; thin continuous clay films; medium acid; gradual, wavy boundary.

B31—33 to 41 inches, yellowish-brown (10YR 5/4) silt loam; moderate, medium, subangular blocky structure; friable; medium acid; clear, wavy boundary.

IIB32—41 to 47 inches, reddish-brown (5YR 4/3) clay; moderate, medium, subangular blocky structure; very firm; medium acid; clear, wavy boundary.

IIR—47 to 60 inches, dolomitic limestone bedrock.

The Ap horizon ranges from 7 to 10 inches in thickness and from black (10YR 2/1) to dark yellowish-brown (10YR 4/4) in color. The upper part of the subsoil is dark yellowish-brown (10YR 4/4 or 10YR 3/4) or dark-brown (10YR 4/3) silt loam or silty clay loam. Dolomite bedrock is at a depth of 36 to 60 inches. In places the bedrock is fractured.

In places areas of sloping and moderately steep Ashdale soils are below and adjacent to Tama soils. In other places areas of gently sloping and sloping Ashdale soils are above and adjacent to Dodgeville soils. Ashdale soils have a thicker and darker colored surface layer than associated Palsgrove soils. Their solum is thicker than that of Dodgeville soils, and their silt mantle is thinner than that of Tama soils.

Ashdale silt loam, 2 to 6 percent slopes, eroded (AsB2).—This soil has the profile described as representative of the series. It is on broad ridgetops in areas of 15 to 40 acres.

Included with this soil in mapping are small areas of Tama silt loam. The Tama soil has higher available water capacity than this soil. Fertility also is higher, and the Tama soil therefore is slightly more productive.

This Ashdale soil is suited to row crops, small grains, and hay. Further erosion is a moderate hazard. If erosion is controlled and other good management is used, row crops can be grown most of the time. Capability unit IIe-1; woodland group 12; wildlife group 1.

Ashdale silt loam, 6 to 12 percent slopes, eroded (AsC2).—Areas of this soil are in the middle parts of slopes of upland ridges. Slopes are convex and are 75 to 150 feet long. The areas receive runoff from slopes above.

The plow layer is very dark grayish brown or brown, but the profile of this soil otherwise is similar to that described as representative of the series. Also, the content of organic matter is slightly lower and tilth is poorer.

Included with this soil in mapping are small areas of Dodgeville soils and areas where erosion is severe. The Dodgeville soils have moderate available water capacity. They generally are less productive than this Ashdale soil. In areas where erosion is severe, tilth is poor, the content of organic matter is moderately low, and the soil is difficult to cultivate.

This Ashdale soil is suited to row crops, small grains, and hay. The hazard of further erosion is severe. Capability unit IIIe-1; woodland group 12; wildlife group 1.

Ashdale silt loam, 12 to 20 percent slopes, eroded (AsD2).—This soil occupies narrow areas on the lower parts of slopes of upland ridges. The areas are 5 to 25 acres in size. Slopes are convex and 50 to 100 feet long. In places drainageways cross the areas.

The surface layer generally is thinner and lighter in color than that in the profile described as representative of the series. Also, thickness of the silt and depth to bedrock are slightly less.

Included with this soil in mapping are small areas of Dodgeville soils. Also included in downslope drainageways are a few fan-shaped areas of Huntsville soils.

If this soil is well managed, it is suited to row crops, small grains, forage crops, pasture, trees, and wildlife. The chief concerns of management are moderately steep slopes, the reduced infiltration rate, and the very severe hazard of further erosion. Large amounts of runoff from higher slopes flow across this soil, and little water is stored for use by plants. Capability unit IVe-1; woodland group 12; wildlife group 1.

Billett Series

The Billett series consists of deep, somewhat excessively drained soils on benches in valleys of large streams. Ground water is at a depth of more than 5 feet throughout the year. Billett soils formed in deep, acid, sandy outwash under thin stands of hardwoods that had an understory of prairie grasses.

In a representative profile the surface layer is about 7 inches of very dark grayish-brown sandy loam. The subsoil, about 29 inches thick, is brown and dark yellowish-brown sandy loam in the upper 13 inches and dark-brown, loose loamy sand in the lower 16 inches. The underlying material is yellowish-brown, single-grained sand.

Natural fertility is moderately low in these soils, and available water capacity is low. Permeability is moderate.

These soils are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. The soils also are suitable for use as pasture, woodland, and wildlife habitat. If they are used for crops, contour stripcropping, diversions, terraces, and grassed waterways help to control water erosion. Planting pine trees for windbreaks and use of wind stripcropping help to control soil blowing. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure help to improve tilth and fertility and to maintain the content of organic matter.

Representative profile of Billett sandy loam, 2 to 6 percent slopes, eroded, in a cultivated field (NE¼NW¼ sec. 11, T. 2 N., R. 9 E.):

Ap—0 to 7 inches, very dark grayish-brown (10YR 3/2) sandy loam; weak, fine, granular structure; very friable; neutral; abrupt, smooth boundary.

B21t—7 to 16 inches, brown (10YR 4/3) sandy loam; weak, fine, subangular blocky structure; friable; slightly acid; a few, patchy, dark yellowish-brown (10YR 4/4) clay films on all ped faces; medium acid; gradual boundary.

B22t—16 to 20 inches, dark yellowish-brown (10YR 4/4) heavy sandy loam; weak, fine, subangular blocky structure; friable; thin, patchy, dark yellowish-brown (10YR 3/4) clay films on all ped faces; strongly acid; clear, wavy boundary.

B3—20 to 36 inches, dark-brown (7.5YR 4/4) loamy sand; weak, fine, subangular blocky structure; very friable; medium acid; gradual, wavy boundary.

C—36 to 60 inches, yellowish-brown (10YR 5/4) medium sand; structureless (single grained); loose; a few, thin, strong-brown (7.5YR 5/6) bands at various intervals; strongly acid.

The A or Ap horizon is black (10YR 2/1), dark brown (10YR 3/3), and very dark grayish brown (10YR 3/2) in color. It is 6 to 10 inches in thickness. In undisturbed areas the soils have a brown A2 horizon about 4 inches thick. Texture of the B2 horizon ranges from sandy loam to light sandy clay loam. Depth to loose sand outwash ranges from 20 to 40 inches. Reaction of this outwash ranges from pH 5.1 to 6.5. Bands of loamy sand and sandy loam are at a depth of 36 to 60 inches. They are strong brown (7.5YR 5/6) to dark brown (7.5YR 4/4) in color and ½ to 1½ inches thick. Overall thickness of the bands is less than 6 inches.

Billett soils are adjacent to Gotham, Meridian, and Tell soils. The Billett soils have a finer textured solum than that in Gotham soils and a coarser textured solum than that in Meridian soils. They lack the silt mantle of Tell soils. Their surface layer is thinner and lighter colored than the surface layer in Dickinson soils. Billett soils are slightly coarser textured and better drained than associated Shiffer soils.

Billett sandy loam, 0 to 2 percent slopes (BlA).—This soil is on benches in areas that are irregular in shape and 40 to 100 acres in size. The plow layer is very dark grayish brown or dark brown in cultivated areas, but it is slightly darker in a few concave areas. This soil is slightly deeper to sand, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are small areas where erosion is moderate because of soil blowing and small areas where the soil is mottled in the lower part of the subsoil. Also included are small areas of Gotham and Meridian soils.

This Billett soil is suited to all crops commonly grown in the county. If it is irrigated, it is well suited to such special crops as potatoes, cucumbers, and green peppers.

Severe droughtiness and a moderate hazard of soil blowing limit use of this soil. Major management concerns are conserving moisture, controlling soil blowing, maintaining tilth and the content of organic matter, and increasing fertility. Capability unit IIIs-4; woodland group 3; wildlife group 1.

Billett sandy loam, 2 to 6 percent slopes, eroded (BlB2).—This soil has the profile described as representative of the series. It is on benches in long areas that range from 30 to 85 acres in size. Slopes are convex and are 200 to 300 feet long.

Included with this soil in mapping are small areas of Meridian and Gotham soils. Also included are small areas where the soil is mottled in the lower part of the subsoil.

If this soil is managed properly, it is suited to row crops, small grains, and hay. Irrigated areas are suited to such special crops as potatoes, snap beans, green peppers, cucumbers, and sweet corn.

The low available water capacity and the hazards of soil blowing and water erosion limit use. Major management concerns are conserving moisture, controlling soil blowing and water erosion, and maintaining the content of organic matter. Capability unit IIIs-4; woodland group 3; wildlife group 1.

Billett sandy loam, 6 to 12 percent slopes, eroded (BlC2).—This soil is on benches in long, narrow areas that range from 20 to 80 acres in size. Slopes are convex and 100 to 200 feet long. In cultivated areas the plow layer is dark brown. In some areas, however, the dark yellowish-brown subsoil is exposed.

This soil is slightly coarser textured throughout and slightly thinner over sand, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are small areas of Gotham soils and a few small areas where slopes are 12 to 20 percent.

If this Billett soil is managed properly, it is suited to all crops commonly grown in the county. The low available water capacity and the severe hazards of water erosion

and soil blowing limit use. Major management concerns are improving tilth, fertility, and content of organic matter; conserving moisture; and controlling erosion. Capability unit IIIe-7; woodland group 3; wildlife group 1.

Boone Series

Soils of this series are moderately deep, excessively drained, and gently sloping to moderately steep. They are in small areas throughout the county. These soils are underlain by sandstone, and they are below outcrops of sandstone bedrock. Ground water is at a depth of more than 5 feet throughout the year. Boone soils formed under pines and black oak in sand washed from sandstone outcrops at a higher altitude.

In a representative profile the surface layer is dark-gray fine sand about 4 inches thick. The underlying material is light brownish-gray and yellowish-brown fine sand. It is underlain by light-gray, light yellowish-brown, or yellowish-brown weakly cemented sandstone.

Natural fertility is low in Boone soils, and available water capacity is very low. Permeability is rapid.

Boone soils are severely limited for crops because they are highly susceptible to soil blowing and water erosion. A few small areas that were once cultivated are now in pasture or trees. Where the cover vegetation has been removed, the soils are subject to severe erosion. Cultivating should be limited to pasture renovation and planting for improvement of wildlife habitat and to woodlots.

Representative profile of Boone fine sand, 2 to 20 percent slopes, in a pasture (SE¼SE¼NW¼ sec. 24, T. 3 N., R. 9 E.):

A1—0 to 4 inches, dark-gray (10YR 4/1) fine sand, dry, very dark grayish brown (10YR 3/2) moist; weak, fine, subangular blocky structure; very friable; neutral; clear, wavy boundary.

C1—4 to 5 inches, light brownish-gray (10YR 6/2) fine sand, dry, brown (10YR 4/3) moist; single grained; loose; medium acid; abrupt, wavy boundary.

C2—5 to 10 inches, yellowish-brown (10YR 5/4) fine sand; single grained; loose: strongly acid; clear, wavy boundary.

C3—10 to 36 inches, yellowish-brown (10YR 5/6) fine sand; single grained; loose; strongly acid; clear, wavy boundary.

R—36 to 60 inches, yellowish-brown (10YR 5/4) sandstone bedrock; hardness less than 3 (Mohs' scale).

Depth to sandstone bedrock ranges from 20 to 40 inches. Color of the undisturbed surface layer ranges from dark gray (10YR 4/1) to black (10YR 2/1). The sand is less than 5 percent weatherable minerals.

Boone soils are coarser textured throughout their profile than the associated Eleva and Elkmound soils, and they lack the textural B horizon typical of those soils. Also, they are coarser textured than the associated Gotham soils.

Boone fine sand, 2 to 20 percent slopes (BoD).—This is the only Boone soil mapped in the county. It is in valleys on the lower parts of hills below steeper areas of sandstone bedrock. Slopes are slightly convex to plane. The plow layer in cultivated areas is thicker and lighter colored than the surface layer in undisturbed areas.

This soil is susceptible to soil blowing and to water erosion. Gullies are difficult to control.

Many areas of Boone fine sand are in native vegetation, and the soil in these areas is only slightly eroded. Areas of this soil that were formerly in crops now support a cover of grass and are used as limited pasture or are idle. They are suitable for wildlife habitat, limited pasture, and trees. The trees can be grown for timber or for sale as Christmas trees. Capability unit VIIs-9; woodland group 4; wildlife group 3.

Brookston Series

The Brookston series consists of poorly drained soils on low benches in glaciated valleys. Ground water is at or near the surface most of the year. These soils are mainly in the southern and eastern parts of the county. They formed under sedges in 15 to 30 inches of silty material and loamy glacial till.

In a representative profile the surface layer is about 18 inches of very dark brown and black silt loam and silty clay loam. The subsoil is about 24 inches of clay loam. It is dark grayish brown in the upper part and olive gray and grayish brown in the lower part. The underlying calcareous loam till is grayish brown and has dark grayish-brown and yellowish-brown mottles.

Natural fertility and available water capacity are high in these soils. Permeability is moderate. The areas are flooded occasionally, but the water subsides in a reasonable length of time.

Wetness severely limits use of these soils. Areas that are drained are suitable for row crops, small grains, and hay. Areas not adequately drained are suitable for pasture or wildlife habitat. Wetness causes these soils to warm slowly in spring. Artificial drainage removes the excess water and helps to speed warming of the soils.

These soils are highly productive under good management that includes providing adequate drainage and maintaining tilth, content of organic matter, and fertility.

Representative profile of Brookston silt loam in a cultivated field (NE¼NE¼ sec. 2, T. 3 N., R. 9 E.):

Ap1—0 to 4 inches, very dark brown (10YR 2/2) silt loam; few, fine, prominent, yellowish-red (5YR 4/8) mottles; weak, fine, subangular blocky structure; friable; slightly acid; abrupt, smooth boundary.

Ap2—4 to 8 inches, very dark brown (10YR 2/2) silt loam; many, fine, prominent, yellowish-red (5YR 4/8) mottles; weak, fine, subangular blocky structure; friable; slightly acid; abrupt, smooth boundary.

A13—8 to 18 inches, black (N 2/0) light silty clay loam; many, fine, prominent, yellowish-red (5YR 4/8) mottles; moderate, fine, granular structure; friable; slightly acid; clear, smooth boundary.

IIB21tg—18 to 24 inches, dark grayish-brown (2.5Y 4/2) clay loam; common, fine, prominent, light olive-brown (2.5Y 5/6) mottles; weak, medium, prismatic structure that breaks to moderate, fine, subangular blocky; firm; thin discontinuous clay films; mildly alkaline; clear, smooth boundary.

IIB22tg—24 to 30 inches, dark grayish-brown (2.5Y 4/2) clay loam; common, fine, distinct, light olive-brown (2.5Y 5/4) mottles; weak, medium, prismatic structure that breaks to moderate, fine, subangular blocky; firm; thin discontinuous clay films; mildly alkaline; gradual, smooth boundary.

IIB31—30 to 35 inches, olive-gray (5Y 5/2) clay loam; many, medium, prominent, yellowish-brown (10YR 5/8) mottles; weak, medium, subangular blocky structure; firm; mildly alkaline; clear, smooth boundary.

IIB32—35 to 42 inches, grayish-brown (2.5Y 5/2) clay loam; massive: firm; mildly alkaline.

Cg—42 to 60 inches, grayish-brown (2.5Y 5/2) loam (60 percent); dark grayish-brown (10YR 4/2) mottles (30 percent); yellowish-brown (10YR 5/6) mottles (10

percent); massive; friable; moderately alkaline; effervescent.

The Ap horizon ranges from very dark gray (10YR 3/1) to black (10YR 2/1) or very dark brown (10YR 2/2). The B horizon is clay loam or sandy clay loam. It ranges from 12 to 30 inches in thickness. Depth to calcareous loam or sandy loam till ranges from 30 to 50 inches.

Brookston soils occupy areas in the landscape below Dodge, Winnebago, and Lamartine soils. They have poorer drainage than the well-drained Dodge and Winnebago soils and the somewhat poorly drained Lamartine soils. Brookston soils are similar in drainage to Ossian soils; but Ossian soils formed entirely in silt, and the subsoil of Brookston soils formed partly in loamy glacial till.

Brookston silt loam (0 to 2 percent slopes) (Br).—This is the only Brookston soil mapped in the county. It is on low benches in stream valleys. Water ponds on the surface in places. The areas are long and are 15 to 75 acres in size.

Included with this soil in mapping are small areas that have a mucky surface layer. In these areas the soil is very wet and is difficult to drain. Also included are areas where limy loamy glacial till is at a depth of 20 to 30 inches.

If this soil is adequately drained and otherwise well managed, it is suited to all common crops. Surface drains and tile drains generally can be used to remove excess water. Capability unit IIw-1; woodland group 7; wildlife group 5b.

Cadiz Series

The Cadiz series consists of deep, well-drained soils on glaciated uplands. In places ground water is at a depth of more than 5 feet, and in other places it is at a depth of 3 to 5 feet in wet periods. These soils are on broad ridges of glacial till in the southwestern corner of the county, south of Browntown. Cadiz soils formed under mixed hardwoods in moderately deep windblown silt over silty clay loam glacial till.

In a representative profile the surface layer is about 7 inches of dark grayish-brown silt loam. The subsoil is 31 inches thick. It is brown silt loam in the upper 8 inches and dark-brown silty clay loam in the lower 23 inches. The underlying material is brown, calcareous, silty clay loam glacial till.

Natural fertility and available water capacity are high in these soils. Permeability is moderately slow. Reaction is slightly acid in uncultivated areas.

These soils are suited to crops; and corn, oats, and alfalfa are the main ones. They also are suited to pasture, woodland, and wildlife habitat.

In cultivated areas contour stripcropping, diversions, terraces, and grassed waterways can be used to help control erosion. Keeping tillage to a minimum, returning crop residue to the soil, and adding barnyard manure are other helpful practices.

Representative profile of Cadiz silt loam, 2 to 6 percent slopes, eroded, in a cultivated field (NE¼SE¼ sec. 22, T. 1 N., R. 6 E.):

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, subangular blocky structure; friable; neutral; abrupt, wavy boundary.

B1—7 to 9 inches, brown (10YR 4/3) silt loam; weak, fine, subangular blocky structure; bleached silt on ped faces; friable; many, fine, fibrous roots; slightly acid; clear, wavy boundary.

B21t—9 to 15 inches, brown (10YR 4/3) heavy silt loam; moderate, fine, subangular blocky structure; bleached silt on ped faces; friable; many, fine, fibrous roots; few thin clay films on most ped faces; slightly acid; clear, wavy boundary.

B22t—15 to 27 inches, dark-brown (10YR 4/3) silty clay loam; moderate, medium, subangular blocky structure; firm; nonplastic; few, fine, fibrous roots; few thin clay films on all ped faces; slightly acid; clear, wavy boundary.

IIB23t—27 to 38 inches, dark-brown (10YR 4/3) heavy silty clay loam that contains 10 to 15 percent fine gravel, by volume; few, fine, faint mottles of yellowish brown (10YR 5/4); moderate, medium, angular blocky structure; very firm; slightly plastic; thin and nearly continuous clay films on ped faces; slightly acid; clear, wavy boundary.

IIC—38 to 60 inches, brown (10YR 5/3) silty clay loam that contains 10 to 15 percent fine gravel, by volume; few, fine, prominent mottles of yellowish brown (10YR 5/6); weak, medium, angular blocky structure; very firm, slightly plastic; moderately alkaline; strongly effervescent.

Depth to weathered glacial till ranges from 24 to 40 inches. The plow layer is 6 to 10 inches thick, and it is very dark gray (10YR 4/1) or dark grayish brown (10YR 4/2). The IIB23t horizon is silty clay or silty clay loam, 4 to 12 inches thick. Mottling generally is evident at a depth of 30 to 40 inches. Where the silt mantle is thick enough, Cadiz soils occupy entire hillsides. Thickness of till over bedrock generally is between 10 and 20 feet.

The Cadiz soils have a lighter colored surface layer than the associated Juda soils. Their subsoil is finer textured than that of the associated Dodge soils. Cadiz soils are above areas of associated Morley soils, and they have a slightly thicker silt mantle than those soils.

Cadiz silt loam, 2 to 6 percent slopes, eroded (CdB2).—This soil has the profile described as representative of the series. It is on broad ridgetops in glaciated uplands. The areas are 25 to 160 acres in size. Slopes are 100 to 250 feet long, and they are slightly convex. In places the surface layer is very dark grayish brown. The silt mantle generally is nearly 36 inches thick, though in areas on tops of ridges it is thicker. In places the underlying material is stratified.

Included with this soil in mapping are eroded areas in which the plow layer is dark brown.

The gentle slopes and moderate hazard of erosion make this soil suited to row crops, small grains, and hay. Further erosion should be kept to a minimum. Improving tilth and increasing the content of organic matter help to reduce runoff and to prevent further erosion. Capability unit IIe-1; woodland group 1; wildlife group 2.

Cadiz silt loam, 6 to 12 percent slopes, eroded (CdC2).—This soil is on the lower parts of glaciated hilly areas. The areas are 20 to 90 acres in size. Slopes are convex and generally are 100 to 200 feet long. This soil receives runoff from sloping soils at higher elevations. A few small drainageways cross the areas.

The plow layer of this soil is thinner, and depth to calcareous silty clay loam till is 24 to 28 inches; but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are small areas of nearly level and moderately steep soils, small areas of Morley soils, and small areas where erosion is severe. In a few places the underlying till is stratified. Where erosion is severe, tilth is poor and cultivation is difficult.

If this soil is protected from erosion, it is suited to row crops, small grains, and hay. The moderately slow permea-

bility and the runoff from higher lying soils make further erosion a severe hazard. Capability unit IIIe-1; woodland group 1; wildlife group 2.

Chaseburg Series

The Chaseburg series consists of deep, well-drained soils in narrow drainageways, on bottom lands, along intermittent streams, and on the lower parts of steep hills throughout the unglaciated part of the county. Ground water is at a depth of more than 5 feet throughout the year. Chaseburg soils are subject to flooding. These soils formed in local water-laid silt that is more than 40 inches thick. The soils continually receive fresh deposits of silt from flood water.

In a representative profile the surface layer is dark grayish-brown silt loam about 3 inches thick. The underlying material, to a depth of 60 inches, is dark grayish-brown and yellowish-brown silt loam.

Natural fertility and available water capacity are high in Chaseburg soils. Permeability is moderate. Streambank erosion is active in many areas.

If these soils are protected from flooding and erosion, they are well suited to corn, small grains, grasses, and legumes. Areas that are inaccessible or that are too dissected by meandering streams are better suited to permanent pasture, woodland, or wildlife habitat. Practices that are especially helpful are shaping and seeding grassed waterways, using diversions, and cultivating on the contour.

Representative profile of Chaseburg silt loam, 2 to 6 percent slopes (NW¼NW¼ sec. 20, T. 1 N., R. 6 E.):

A1—0 to 3 inches, very dark grayish-brown (10YR 3/2) silt loam; weak subangular blocky structure; friable; neutral; clear, smooth boundary.

C1—3 to 24 inches, dark grayish-brown (10YR 4/2) silt loam and thin layers of grayish-brown (10YR 5/2) silt loam; moderate, thin and medium, platy structure; friable; neutral; abrupt, smooth boundary.

C2—24 to 27 inches, thin layers of yellowish-brown (10YR 5/4) silt loam; weak, thin, platy structure; friable; neutral; abrupt, wavy boundary.

C3—27 to 60 inches, dark grayish-brown (10YR 4/2) silt loam and thin layers of brown (10YR 5/3) silt loam; weak, medium, platy structure; friable; neutral.

Differences in source of sediment cause minor variations in color and texture throughout the profile of these soils. In places the soils contain chert fragments less than 2 inches in diameter. In a few areas where a thin layer of sandy overwash is on these soils, the surface layer is fine sandy loam. Reaction of these soils ranges from slightly acid to neutral.

Chaseburg soils occupy positions on flood plains similar to those of Huntsville soils, but they are lighter colored than the Huntsville soils. Chaseburg soils lack the buried, dark-colored soil typical of Arenzville soils, which also formed in alluvium.

Chaseburg silt loam, 2 to 6 percent slopes (ChB).—This soil has the profile described as representative of the series. The areas, which are 2 to 10 acres in size, are in drainageways, on intermittent stream bottoms, and on alluvial fans of terraces and high bottoms.

Included with this soil in mapping are areas where the layer of recently deposited silty material is less than 40 inches thick and areas of soil underlain by a buried light-colored silty soil that has a subsoil of silty clay loam. Also included are areas where the surface layer is slightly thicker than that in the profile described as representative of the series and areas, especially at heads of draws, where cobblestones or other stones are on the surface or throughout the profile.

This Chaseburg soil is suited to corn, small grains, grasses, and legumes. The hazard of erosion is moderate. Practices are needed that prevent gullying and prevent further damage to the soil from soil material washed onto it from higher lying areas. Capability unit IIe-5; woodland group 1; wildlife group 7.

Chaseburg silt loam, 6 to 12 percent slopes (ChC).—This soil is in sloping, narrow drainageways. The areas are 5 to 10 acres in size. Included with this soil in mapping are areas where the layer of recently deposited silt is less than 40 inches thick. In these areas the underlying material consists of a buried darker soil that has a subsoil of silty clay loam.

If this soil is well managed, it is suitable for crops. Most areas that are dissected by an intermittent watercourse are too narrow to be cultivated intensively. Such areas are better suited to pasture, meadow, or wildlife habitat than to crops. Runoff is rapid on this soil, and practices that help control gullying and erosion are needed if the soil is used for crops. Capability unit IIIe-5; woodland group 1; wildlife group 7.

Chaseburg and Arenzville silt loams (0 to 2 percent slopes) (Cn).—This mapping unit is about 70 percent Chaseburg silt loam and about 30 percent Arenzville silt loam. These soils are on alluvial fans at the base of drainageways and on flood plains of intermittent stream.

The Chaseburg soil has a profile similar to that described as representative of the series. The Arenzville soils are similar to Chaseburg soils, but they have a buried soil of black silt loam at a depth of about 3 feet.

The soils in this unit are suited to all crops commonly grown in the county. Under good management that includes applying adequate amounts of fertilizer, these soils can be cropped intensively. The hazard of erosion is slight, but no special practices are needed to protect the soil, except where flooding occurs. In these areas dikes can be used to prevent washing by the floodwater. If flooding does occur, the water recedes after a short time. Capability unit I-2; woodland group 1; wildlife group 7.

Colwood Series

Soils of the Colwood series are deep and poorly drained. They are on low benches in old lake basins. Ground water is at or near the surface of these soils most of the year. Most areas are in the east-central part of the county, north of Brodhead. These soils formed under sedges in alternating layers of calcareous lake-laid silt and fine sand. The upper 2 or 3 feet is silty, and the soil below is highly stratified.

In a representative profile the surface layer is about 15 inches of black silt loam. The content of organic matter is very high in the upper part of the surface layer. The lower part of the surface layer has yellowish-brown mottles. The subsoil is about 12 inches of gray silt loam and silty clay loam. The underlying calcareous silt and fine sand sediment is grayish brown and dark gray.

Natural fertility is moderate in these soils, and available water capacity is high. Permeability is moderate. Reaction is mildly alkaline to slightly acid.

Drained areas of these soils are suited to row crops, small grains, and clover grown for hay. Undrained areas provide good wildlife habitat and limited pasture. Open ditches are more practical than other methods for removing excess water. Tile drains can be used in places if they are blinded properly. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure are other helpful practices.

Representative profile of Colwood silt loam in a cultivated field (southwest corner of SE¼SW¼ sec. 2, T. 3 N., R. 9 E.):

A11—0 to 9 inches, black (10YR 2/1) mucky silt loam; weak, medium, granular structure to moderate, coarse, platy; friable; neutral; gradual, wavy boundary.

A12—9 to 15 inches, black (10YR 2/1) silt loam; common, fine, prominent, yellowish-brown (10YR 5/6) mottles; moderate, medium, subangular blocky structure; friable; neutral; clear, smooth boundary.

B1g—15 to 19 inches, gray (5Y 5/1) silt loam; common, medium, prominent yellowish-brown (10YR 5/8) mottles; moderate, fine, subangular blocky structure; friable; mildly alkaline; clear, smooth boundary.

B2g—19 to 23 inches, gray (5Y 5/1) silty clay loam, moderate content of medium sand; common, medium, prominent, yellowish-brown (10YR 5/8) mottles; weak, medium, subangular blocky structure; firm; mildly alkaline; gradual, smooth boundary.

B3g—23 to 27 inches, gray (5Y 5/1) silty clay loam, moderate content of medium sand; weak, fine, platy structure; firm; mildly alkaline; gradual, smooth boundary.

C1g—27 to 32 inches, dark-gray (5Y 4/1) silt loam; moderate, coarse, platy structure; friable; moderately alkaline; effervescent; gradual, smooth boundary.

C2g—32 to 60 inches, stratified grayish-brown (2.5Y 5/2) and light brownish-gray (2.5Y 6/2) silt and fine sand; weak, medium, platy structure; friable; moderately alkaline; effervescent.

The A horizon ranges from 10 to 20 inches in thickness. In places the B horizon contains thin layers of sandy loam. The A and B horizons combined range from 20 to 30 inches in thickness. Where the areas have a layer of fine sand within a depth of 40 inches, the soils are outside the accepted range of characteristics for this series. The underlying soil consists of silt, very fine sand, and fine sand.

Colwood soils are associated with soils of the Hebron series, mottled subsoil variants, and soils of the Navan and Sebewa series. The Colwood soils are more poorly drained and more permeable than the mottled subsoil variants from the Hebron series. They formed entirely in lacustrine material, unlike Navan soils that formed in loamy outwash and silty clay loam lacustrine material. Colwood soils are underlain by silt loam, silt, and fine sand, unlike Sebewa soils, which are underlain by sand and gravel.

Colwood silt loam (0 to 2 percent slopes) (Co).—This is the only Colwood soil mapped in the county. It is on low benches in old lake basins. The areas are 10 to 50 acres in size, and they are irregular in shape.

Included with this soil in mapping are small areas where the soil is slightly better drained than this soil. In these areas the surface layer is thinner and lighter colored. Also included are small areas where the surface layer is loam.

If this soil is adequately drained, it can be used for row crops and forage. Also needed are practices that help to maintain tilth and fertility. Capability unit IIw-1; woodland group 7; wildlife group 5b.

Dakota Series

The Dakota series consists of deep, well-drained soils on high benches. Ground water is at a depth of more than 5 feet throughout the year. These soils formed under prairie grasses in sandy, acid outwash. Where soil blowing has occurred these soils are gently undulating and have no well-defined drainageways.

In a representative profile the surface layer is about 10 inches of very dark brown and very dark grayish-brown light loam, and the subsurface layer is dark-brown light loam. The subsoil, about 20 inches thick, is dark-brown loam in the upper part and dark-brown sandy loam in the lower part. It is underlain by light yellowish-brown sandy outwash.

Natural fertility, available water capacity, and permeability are moderate in these soils.

Dakota soils are suited to crops. Corn, oats, and alfalfa are the main ones. The soils also are suited to pasture and wildlife habitat. The nearly level to gentle slopes and high content of sand and organic matter make these soils well suited to irrigation and to such special crops as snap beans and cucumbers.

Contour stripcropping, diversions, terraces, and grassed waterways are needed to help to control erosion and conserve moisture in cultivated areas. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure also are needed.

Representative profile of Dakota loam, 0 to 2 percent slopes, in a cultivated field (NW¼SW¼ sec. 36, T. 2 N., R. 9 E.):

Ap—0 to 7 inches, very dark brown (10YR 2/2) light loam; weak, medium, granular structure; friable; neutral; abrupt, wavy boundary.

A12—7 to 10 inches, very dark grayish-brown (10YR 3/2) light loam; weak, medium, granular structure; friable; strongly acid; clear, wavy boundary.

A3—10 to 13 inches, dark-brown (10YR 4/3) light loam; weak, fine, subangular blocky structure; friable; very strongly acid; gradual, wavy boundary.

B2t—13 to 24 inches, dark-brown (10YR 4/3) heavy loam; weak, medium, subangular blocky structure; friable; thin, discontinuous, dark yellowish-brown (10YR 4/4) clay films; very strongly acid; gradual, wavy boundary.

B3—24 to 33 inches, dark-brown (7.5YR 4/4) sandy loam; weak, fine, granular structure; very friable; strongly acid; gradual, wavy boundary.

C—33 to 60 inches, light yellowish-brown (10YR 6/4) medium sand; single grained; loose; medium acid; gradual, wavy boundary.

The solum in these soils ranges from 20 to 40 inches in thickness. The Ap and A12 horizons are black (10YR 2/1), very dark brown (10YR 2/2), very dark grayish brown (10YR 3/2), or dark brown (10YR 3/3). In the B2t horizon texture ranges from loam to heavy sandy loam to sandy clay loam. The B3 horizon is sandy loam or loamy sand. Loose sand is at a depth of 20 to 40 inches. Reaction of the sand ranges from pH 5.0 to 6.0. This sand is grayish brown, light yellowish brown, or brownish yellow.

Dakota soils are associated with Dickinson, Gotham, Lawler, and Pillot soils. They are finer textured than Dickinson and Gotham soils. Dakota soils are similar to Lawler soils, but they are better drained.

Dakota loam, 0 to 2 percent slopes (DaA).—This soil has the profile described as representative of the series. It is on high benches in valleys of streams. The areas are 20 to 480 acres in size and are irregular in shape. The surface layer is dark brown in areas where the soil has been blown. In places loose sand is at a depth of more than 40 inches.

Included with this soil in mapping are areas of moderately well drained soils where water collects on the sur-

face. Also included are small areas where the soil material is slightly coarser textured than that in this soil.

The moderate available water capacity and slight susceptibility to soil blowing limit use of this Dakota soil. Nevertheless, if this soil is well managed, it is suited to all crops commonly grown in the county. Keeping tillage to a minimum and applying other practices that conserve moisture are especially important. Capability unit IIs–1; woodland group 12; wildlife group 4.

Dakota loam, 2 to 6 percent slopes, eroded (DaB2).—This soil is on benches in stream valleys. The areas are 40 to 640 acres in size and are irregular in shape. The surface layer is dark brown in areas where soil blowing has occurred.

This soil is shallower to sand, but the profile otherwise is similar to that described as representative of the series. Included in mapping are small areas of Dickinson soils and a few small areas of Meridian soils.

The moderate erosion hazard, moderate available water capacity, and slight susceptibility to soil blowing limit use of this soil. If this soil is well managed, however, it is suited to row crops, small grains, and hay. The chief concerns of management are conserving moisture, controlling erosion, and maintaining the content of organic matter. Capability unit IIe–2; woodland group 12; wildlife group 4.

Dells Series

The Dells series consists of deep, somewhat poorly drained soils on benches in stream valleys. These soils are moderately deep over sand. They formed under mixed hardwoods in silt underlain by acid sand outwash.

In a representative profile the surface layer is about 7 inches of very dark gray silt loam, and the platy subsurface layer is about 2 inches of dark grayish-brown silt loam. The subsoil, about 24 inches thick, is dark-brown silt loam and silty clay loam in the upper part and dark-brown loam in the lower part. Mottles are common throughout the subsoil. The underlying material is loose brown sand.

Natural fertility, available water capacity, and permeability are moderate in these soils. The content of organic matter is moderately high.

If these soils are adequately drained, they are suited to all common crops. All areas of the soils are suited to trees and to wildlife habitat.

Flooding occurs in places during periods of prolonged rainfall, and water stands in depressions long enough to reduce crop growth. Open ditches can be used to provide drainage if adequate outlets are available. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure are other helpful practices.

Representative profile of Dells silt loam, 0 to 3 percent slopes, in a cultivated field (SE¼NW¼ sec. 27, T. 2 N., R. 9 E.).

Ap—0 to 7 inches, very dark gray (10YR 3/1) silt loam; weak, very fine, subangular blocky structure; friable; neutral; clear, smooth boundary.

A2—7 to 9 inches, dark grayish-brown (10YR 4/2) silt loam; a few, fine, distinct mottles of dark brown (7.5YR 4/4); weak, medium, platy structure; friable; neutral; clear, smooth boundary.

B1—9 to 16 inches, dark-brown (10YR 4/3) silt loam; common, fine, faint mottles of dark brown (7.5YR 4/4) and dark grayish brown (10YR 4/2); weak, medium, platy and moderate, very fine, subangular blocky structure; firm; medium acid; gradual, smooth boundary.

B2t—16 to 28 inches, dark-brown (10YR 4/3) silty clay loam; common, medium, faint mottles of dark brown (7.5YR 4/4), brown (10YR 5/3), and dark grayish brown (10YR 4/2); moderate, fine, subangular blocky structure; firm; thin, patchy clay films on all ped faces; strongly acid; gradual, smooth boundary.

I&IIB3t—28 to 33 inches, dark-brown (10YR 4/3) loam; many, medium, prominent mottles of yellowish brown (10YR 5/6) and faint dark grayish brown (10YR 4/2); weak, medium, subangular blocky structure; many, thin, bleached silt coats and a few thin clay films on ped faces; firm; strongly acid; gradual, smooth boundary.

IIC—33 to 60 inches +, brown (10YR 5/3) sand; common, medium, prominent, yellowish-brown (10YR 5/6) mottles; single grained; loose; medium acid.

The A horizon ranges from 4 to 10 inches in thickness. It is black (10YR 2/1), very dark grayish brown (10YR 3/2), or very dark gray (10YR 3/1). The A2 horizon ranges from 3 to 6 inches in thickness and is dark grayish brown (10YR 4/2), brown (10YR 5/3), or grayish brown (10YR 5/2).

The B horizon ranges from 8 to 27 inches in thickness. It is silt loam or silty clay loam in the upper part and loam or sandy loam in the lower part. Color is dark brown or yellowish brown.

The solum ranges from 24 to 34 inches in thickness. Reaction in the IIC horizon is pH 5 to 6.5.

Dells soils are associated with Shiffer soils and with Stronghurst soils, benches; and they are adjacent to and below Tell soils. They are shallower to loose sand than the Stronghurst soils. The subsoil of Dells soils formed in two different materials, but that of Shiffer soils formed only in loamy outwash.

Dells silt loam, 0 to 3 percent slopes (DbA).—This is the only soil of the Dells series mapped in the county. It is on benches below better drained soils. The areas are 10 to 25 acres in size. Slopes are slightly convex or plane.

Included with this soil in mapping are areas of better drained Tell soils and areas where the mantle of silt is 34 to 50 inches thick.

Wetness and medium natural fertility limit use of this soil. If this soil is adequately drained, it is suited to row crops, small grains, and hay. All areas of this soil are suited to trees and wildlife habitat. Major management concerns are removing excess water, increasing fertility, and maintaining the content of organic matter. Capability unit IIw–5; woodland group 7; wildlife group 5a.

Del Rey Series

The Del Rey series consists of deep, somewhat poorly drained soils on low benches in old lake basins. Ground water is at a depth of 1 to 3 feet in wet periods. Del Rey soils formed under mixed hardwoods in more than 5 feet of lake-laid silt and clay.

In a representative profile the surface layer is dark-gray silt loam about 8 inches thick. The subsurface layer, about 2 inches thick, is dark grayish-brown platy silt loam. The subsoil is about 16 inches thick. It is brown silty clay loam in the upper part and grayish-brown silty clay loam and silty clay in the lower part. The underlying lacustrine sediment is grayish-brown, calcareous silty clay loam.

Natural fertility and available water capacity are high in Del Rey soils. Permeability is moderately slow. Reaction

is slightly acid or medium acid. The content of organic matter is moderately high. Tilth is good.

Drained areas of these soils are suited to crops, and all areas are suited to trees and wildlife habitat. Tile drains or open ditches can be used to help lower the water table in these soils. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure help to maintain good tilth and content of organic matter and to improve fertility. Timeliness of tillage is also important.

Representative profile of Del Rey silt loam in a cultivated field (NE¼SE¼SE¼ sec. 7, T. 1 N., R. 6 E.):

Ap—0 to 8 inches, dark-gray (10YR 4/1) silt loam; weak, fine, granular structure; friable; abrupt, wavy boundary.

A2—8 to 10 inches, dark grayish-brown (10YR 4/2) silt loam; weak, thin, platy structure; friable; slightly acid; clear, wavy boundary.

B1—10 to 14 inches, brown (10YR 4/3) silty clay loam; common, fine, prominent, yellowish-brown (10YR 5/8) and faint grayish-brown (10YR 5/2) mottles; moderate, fine, subangular blocky structure; firm; medium acid; clear, wavy boundary.

B21t—14 to 18 inches, grayish-brown (10YR 5/2) heavy silty clay loam; common, fine, faint, dark grayish-brown (10YR 4/2) mottles and prominent strong-brown (7.5YR 5/8) mottles; moderate, fine, subangular blocky structure; firm when moist, sticky when wet; thin, continuous, gray (10YR 5/1) clay films; medium acid; clear, wavy boundary.

B22t—18 to 26 inches, grayish-brown (10YR 5/2) silty clay; common, medium, faint, gray (10YR 5/1) mottles; strong, medium, angular blocky structure; very firm; thin continuous clay films; medium acid; clear, wavy boundary.

Cg—26 to 60 inches, grayish-brown (10YR 5/2) silty clay loam; common, fine, faint, gray (5Y 5/1) mottles; moderate, medium, platy structure; firm; moderately alkaline; effervescent.

The Ap horizon is dark grayish brown (10YR 3/2), black (10YR 2/1), or dark gray (10YR 4/1). The platy A2 horizon is light brownish gray, grayish brown, or dark grayish brown. It ranges from 2 to 6 inches in thickness. The B horizon ranges from 10 to 30 inches in thickness, and the solum ranges from 20 to 40 inches in thickness.

Del Rey soils are next to soils of the Hebron series, mottled subsoil variant, and below Saylesville soils. Their entire solum formed in lacustrine material, unlike soils of the Hebron series, mottled subsoil variant, which formed partly in outwash. Del Rey soils are more poorly drained than Saylesville soils.

Del Rey silt loam (0 to 2 percent slopes) (Dc).—This is the only Del Rey soil mapped in the county. It is on low benches in areas of 10 to 45 acres that are irregular in shape. In places water ponds on the surface.

Included with this soil in mapping are areas of better drained Saylesville soils and more poorly drained Navan and Ossian soils. Also included are areas where the soil has a loamy overburden 10 to 20 inches thick.

Drained areas of this soil are suited to all crops commonly grown in the county. Undrained areas are not well suited to crops, and alfalfa is killed more easily in winter in these areas than in drained areas. Open ditches can be used for surface drainage, and tile drains can be used for subsurface drainage. Timeliness of tillage is important. The soil dries slowly because the clay in the subsoil restricts percolation. Where tilth of the surface layer has been destroyed, drying is even slower. Cultivating only when the soil is dry enough, keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure are helpful practices. Capability unit IIw-2; woodland group 7; wildlife group 5a.

Dickinson Series

Dickinson soils are somewhat excessively drained sandy loams. They are moderately deep to sand. Most areas are on high sandy benches where the topography is gently undulating. Ground water is at a depth of more than 5 feet throughout the year. Dickinson soils formed under prairie grasses in acid, sandy outwash. Only a few well-defined drainageways are in these soils. Soil blowing has stripped the topsoil in places and redeposited it in others.

In a representative profile the surface layer is about 9 inches of black sandy loam, and the subsurface layer is about 4 inches of very dark grayish-brown sandy loam. The subsoil, about 13 inches thick, is dark-brown sandy loam in the upper part and yellowish-brown loamy sand in the lower part. It is underlain by yellowish-brown, single-grained sand.

Natural fertility and available water capacity are low in these soils. Permeability is moderately rapid.

The gentle slopes, high content of organic matter, moderately rapid permeability, good stability under loads, and low reaction make Dickinson soils well suited to irrigation. If irrigation is provided and these soils are otherwise well managed, they are well suited to all common crops and to such specialty crops as cucumbers, beans, potatoes, green peppers, and tomatoes. Also, these soils are well suited to pasture, hay, trees, and wildlife habitat. The planting of windbreaks and use of stripcropping are important because these soils blow readily. Keeping tillage to a minimum, stubble mulching crop residue, and applying barnyard manure help to conserve moisture and to maintain the content of organic matter.

Representative profile of Dickinson sandy loam, 1 to 3 percent slopes, in a cultivated field (NE¼SE¼ sec. 2, T. 1 N., R. 9 E.):

Ap—0 to 9 inches, black (10YR 2/1) sandy loam; weak, fine, granular structure; very friable; slightly acid; abrupt, wavy boundary.

A3—9 to 13 inches, very dark grayish-brown (10YR 3/2) light sandy loam; weak, fine, granular structure; very friable; slightly acid; clear, wavy boundary.

B2—13 to 18 inches, dark-brown (10YR 3/3) light sandy loam; moderate, fine, subangular blocky structure; friable; medium acid; clear, wavy boundary.

B3—18 to 26 inches, yellowish-brown (10YR 5/5) loamy sand; weak, fine, subangular blocky structure; very friable; medium acid; clear, wavy boundary.

C—26 to 60 inches, mixed colors of light yellowish-brown and yellowish-brown (10YR 6/4, 10YR 5/6, 10YR 5/8) sand; single grained; loose; medium acid.

In cultivated and eroded areas, the Ap horizon is very dark grayish brown or black. The solum ranges from 20 to 34 inches in thickness. Color of the underlying sand ranges from strong brown (7.5YR 5/6) to light yellowish brown (10YR 6/4). Reaction of this sand ranges from pH 4.8 to 6.0.

Dickinson soils are associated with Dakota and Gotham soils. They are not so well developed as Dakota soils. Dickinson soils have slightly more clay in their subsoil than Gotham soils, and they have a slightly thicker and darker colored surface layer.

Dickinson sandy loam, 1 to 3 percent slopes (DdA).—This is the only Dickinson soil mapped in the county (fig. 3). It is on high benches in areas of 50 to 320 acres.

Areas are irregular in shape. Only a few well-defined drainageways are in this soil.

Included with this soil in mapping are areas where the surface layer is loamy sand that is more droughty than this Dickinson soil. Also included are areas where water collects and the soil is moderately well drained. In other included areas the soil is 36 to 48 inches deep over sandy outwash, or gravel and coarse sand are at a depth of less than 40 inches.

The soil is suited to small grains, hay, pasture, trees, and wildlife habitat. Under careful management, row crops can be grown in the cropping sequence. The low available water capacity and natural fertility and the severe hazard of soil blowing limit use of this soil. Major concerns of management are conserving moisture, controlling erosion, increasing fertility, and maintaining the content of organic matter. Capability unit IIIs-4; woodland group 3; wildlife group 4.

Dodge Series

The Dodge series consists of deep, well-drained soils on glaciated uplands and on high benches in stream valleys. Ground water is at a depth of more than 5 feet throughout the year. These soils formed under stands of mixed hardwoods in moderately deep loess underlain by loam glacial till.

In a representative profile the surface layer is 5 inches of dark-gray silt loam. The subsurface layer, about 6 inches thick, is grayish-brown silt loam. The subsoil, about 27 inches thick, is brown and yellowish brown. It is silt loam and silty clay loam in the upper 20 inches and clay loam in the lower 7 inches. The subsoil is underlain by yellowish-brown, calcareous loam.

Available water capacity and natural fertility are high in these soils. Permeability is moderate.

These soils are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. The soils are also suited to pasture, trees, and wildlife habitat.

Contour stripcropping, diversions, terraces, and grassed waterways help to control erosion in cultivated areas. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure are other helpful practices.

An undisturbed profile within an area of Dodge silt loam, 2 to 6 percent slopes, eroded (NE$\frac{1}{4}$NE$\frac{1}{4}$ sec. 23, T. 2 N., R. 8 E.):

A1—0 to 5 inches, dark-gray (10YR 4/1) silt loam; moderate, fine, subangular blocky structure; friable; mildly alkaline; abrupt, wavy boundary.

A2—5 to 11 inches, grayish-brown (10YR 5/2) silt loam; moderate, fine, platy structure; friable; mildly alkaline; abrupt, wavy boundary.

B1—11 to 18 inches, brown (10YR 4/3) silt loam; continuous bleached silt coats; moderate, medium, subangular blocky structure; friable; neutral; gradual, wavy boundary.

B21t—18 to 31 inches, brown (10YR 4/3) silty clay loam; moderate, medium, subangular blocky structure; firm; thin, discontinuous, dark yellowish-brown (10YR 4/4) clay films; slightly acid; gradual, wavy boundary.

IIB22t—31 to 38 inches, brown (10YR 4/3) clay loam; moderate, medium, subangular blocky structure; firm; thin, discontinuous, dark yellowish-brown (10YR 4/4) clay films; slightly acid; clear, wavy boundary.

Figure 3.—**Typical profile of Dickinson sandy loam.**

IIC1—38 to 55 inches, yellowish-brown (10YR 5/4) loam; discontinuous organic stains; massive; friable; moderately alkaline; effervescent; gradual, wavy boundary.

IIC2—55 to 60 inches, yellowish-brown (10YR 5/4) loam; common, medium, distinct, strong-brown (7.5YR 5/6) mottles; massive; friable; moderately alkaline; effervescent.

The Ap horizon in cultivated areas ranges from 5 to 8 inches in thickness and from dark grayish brown to brown in color. The A2 horizon is grayish brown (10YR 5/2) or dark grayish brown (10YR 4/2). In places it has all been mixed into the Ap horizon by plowing. The silt mantle ranges from 20 to 36 inches in thickness. In places the B22t horizon is mottled in the lower part. The underlying calcareous till is brown or yellowish-brown heavy sandy loam, loam, or light silt loam.

Dodge soils are associated with Lamartine and Saybrook soils and soils of the Fayette series that have a loamy substratum. Dodge soils are better drained than Lamartine soils. They have a thinner and lighter colored surface layer than Saybrook soils, and the mantle of silt in Dodge soils is thinner than that of associated Fayette soils.

Dodge silt loam, 2 to 6 percent slopes, eroded (DeB2).—This soil has the profile described for the series. It is in long, narrow areas, 45 to 85 acres in size, on ridgetops and the upper parts of slopes. The plow layer generally is dark grayish brown in cultivated areas, but in a few places in these areas this layer is very dark grayish brown. Slopes are 150 to 250 feet long.

Included with this soil in mapping are small areas of Fayette silt loam, loamy substratum. Also included are areas where the soil is moderately well drained. In these areas the available water capacity is slightly higher than that in this soil.

If this soil is managed properly, it is suited to all crops commonly grown in the county. Use of this soil is

restricted only by the moderate hazard of further erosion. Major management concerns are increasing the content of organic matter, improving tilth, increasing fertility, and controlling erosion. Tilth is better and the content of organic matter is higher in areas where the soil is not eroded. Capability unit IIe–1; woodland group 1; wildlife group 1.

Dodge silt loam, 6 to 12 percent slopes, eroded (DeC2).—This soil is in narrow areas of 40 to 70 acres. The areas are mostly uniform in shape. A few narrow drainageways cross the areas. Slopes are 100 to 150 feet long. The terrain is slightly convex.

The surface layer in cultivated areas is lighter in color and thinner than that in the profile described for the series. In a few places this layer is very dark grayish brown or dark brown.

Included with this soil in mapping are small areas of Miami silt loam. Also included are areas where the soil is moderately well drained.

If this soil is well managed, it is suited to all crops commonly grown in the county. The severe hazard of further erosion is the only limitation to use of this soil. The chief concerns of management are controlling erosion, increasing the content of organic matter, improving tilth, and increasing fertility. Capability unit IIIe–1; woodland group 1; wildlife group 1.

Dodgeville Series

The Dodgeville series consists of moderately deep, well-drained soils that are underlain by dolomite. Ground water is at a depth of more than 5 feet throughout the year. Dodgeville soils formed under prairie grasses in moderately thin loess and in clayey residuum from dolomite. Bedrock of fractured dolomite is at a depth of 2 to 3½ feet.

In a representative profile the surface layer is about 8 inches of black silt loam, and the subsurface layer is about 5 inches of very dark grayish-brown silt loam. The subsoil, about 23 inches thick, is dark yellowish-brown and brown silty clay loam in the upper 11 inches and dark-brown clay in the lower 12 inches. It is underlain by fractured dolomite.

Available water capacity and natural fertility are moderate in these soils. Permeability is moderately slow.

These soils are suited to most crops commonly grown in the county. The main crops are corn, oats, and alfalfa. The soils also are suited to pasture and to wildlife habitat.

Contour stripcropping, diversions, terraces, and grassed waterways help to control erosion in cultivated areas. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure are other helpful practices.

Representative profile of Dodgeville silt loam, 2 to 6 percent slopes, eroded, in a cultivated field near a quarry (NE¼NE¼ sec. 4 T. 1., R. 8 E.):

Ap—0 to 8 inches, black (10YR 2/1) silt loam; weak, fine, subangular blocky structure; friable; neutral; clear, smooth boundary.

A3—8 to 13 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, fine, subangular blocky structure; friable; slightly acid; clear, wavy boundary.

B1—13 to 16 inches, dark yellowish-brown (10YR 4/4) light silty clay loam; moderate, fine, subangular blocky structure; friable; medium acid; clear, wavy boundary.

B21t—16 to 24 inches, brown (10YR 4/3) silty clay loam; moderate, medium, subangular blocky structure; firm; thin, discontinuous, dark yellowish-brown (10YR 4/4) clay films; medium acid; gradual, wavy boundary.

IIB22t—24 to 36 inches, dark-brown (7.5YR 4/4) clay; strong, fine, angular blocky structure; very firm; thin continuous clay films; neutral; abrupt, wavy boundary.

IIR—36 to 60 inches, shattered and partly disintegrated dolomite bedrock.

In cultivated areas the Ap horizon ranges from 7 to 10 inches in thickness and is black (10YR 2/1), very dark grayish brown (10YR 3/2), or dark brown (10YR 3/3) in color. Depth to clayey residuum ranges from 15 to 30 inches. The residuum ranges from clay to clay loam in texture, from dark red (2.5YR 3/6) to dark brown (7.5YR 4/4) in color, and from 10 to 16 inches in thickness. Where these soils are adjacent to glaciated soils, 2 to 4 inches of clay loam or sandy clay loam weathered from glacial till is above the clayey residuum and glacial pebbles are on the surface.

Dodgeville soils are associated with Ashdale, Edmund, NewGlarus, and Sylvester soils. They are shallower to bedrock than Ashdale soils and deeper to bedrock than Edmund soils. Their surface layer is thicker and darker than that of NewGlarus soils. The Dodgeville soils are underlain by dolomite, unlike the Sylvester soils, which are underlain by sandstone.

Dodgeville silt loam, 2 to 6 percent slopes, eroded (DgB2).—This soil has the profile described as representative of the series. It is on broad ridgetops and the upper parts of slopes in areas of 25 to 165 acres. Slopes are smooth and convex and are 150 to 200 feet long.

Included with this soil in mapping are small areas of Ashdale soils. Also included are small areas where the slope is 6 to 8 percent and the hazard of erosion is severe.

This Dodgeville soil is suited to all crops commonly grown in the county. Because of the limited water capacity, practices are needed that help to conserve much of the rain that falls. In addition practices are needed that maintain or improve tilth and the content of organic matter. Capability unit IIe–2; woodland group 12; wildlife group 4.

Dodgeville silt loam, 6 to 12 percent slopes, eroded (DgC2).—This soil is in narrow areas on side slopes. Slopes are 100 to 175 feet long. A few narrow drainageways are a common feature on this soil. Relief is smooth and convex. This soil is slightly thinner over bedrock, but the profile otherwise is similar to that described as representative of the series. The surface layer is very dark brown.

Included with this soil in mapping are areas of Edmund soils.

If this Dodgeville soil is managed properly, it is suited to row crops, small grains, hay, pasture, and wildlife habitat. The slope, limited water capacity, severe hazard of further erosion, and moderate depth to bedrock limit use. Practices are needed that control erosion and conserve moisture. Capability unit IIIe–2; woodland group 12; wildlife group 4.

Dodgeville silt loam, 6 to 12 percent slopes, severely eroded (DgC3).—This soil is in narrow areas on the middle and lower parts of slopes. Small drainageways are common. The areas are 50 to 125 acres in size. Slopes are 100 to 150 feet long. The surface layer is dark brown to yellowish brown and is 5 or 6 inches thick and the soil is shallower to bedrock, but the profile otherwise is similar to that described as representative of the series. Much of the subsoil has been plowed into the surface layer of this soil.

The content of organic matter is low, and tilth is very poor in this soil. Runoff is high because the infiltration rate is low. Permeability is slow in the subsoil.

This soil is suited to small grains, hay, pasture, and wildlife habitat. The slope, very severe hazard of further erosion, rapid runoff, and moderate available water capacity limit use. Practices are needed that improve tilth, increase the content of organic matter, conserve moisture, and control erosion. Capability unit IVe-2; woodland group 12; wildlife group 4.

Dodgeville silt loam, 12 to 20 percent slopes, eroded (DgD2).—This soil is in narrow areas on the lower parts of slopes. The areas are 50 to 150 acres in size. In places topsoil has accumulated at the base of the slopes. The surface layer is very dark grayish brown. Small drainageways commonly cross the areas. Slopes are 50 to 150 feet long. This soil is 20 to 28 inches thick over dolomite, but its profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are small areas of Edmund soils and areas where the plow layer is severely eroded, low in organic-matter content, and in poor tilth. Also included are small areas of Lindstrom and Huntsville soils at the bases of slopes and in downslope drainageways.

This soil is suited to small grains, forage crops, pasture, and wildlife habitat. The main concerns of management are the slope, the severe hazard of further erosion, and the limited thickness over bedrock. If this soil is cultivated, practices are needed that help to control erosion, conserve moisture, and maintain tilth and the content of organic matter. Capability unit IVe-2; woodland group 12; wildlife group 4.

Downs Series

The Downs series consists of deep, well-drained soils on uplands and high glaciated benches. Ground water is at a depth of more than 5 feet throughout the year. Downs soils formed in about 4 to 10 feet of loess under thin stands of mixed hardwoods that had an understory of grass. The loess is underlain by sandstone or dolomite bedrock. In places the substratum is underlain at a depth of 50 to 70 inches by calcareous silty clay loam glacial till.

In a representative profile the surface layer is about 9 inches of very dark brown silt loam. The subsurface layer is about 3 inches of dark grayish-brown, friable silt loam that is slightly acid. The subsoil is about 37 inches thick. It is brown and dark yellowish-brown silt loam and silty clay loam in the upper part and brown and yellowish-brown silty clay loam and silt loam in the lower part. The substratum is brown, strongly acid silt loam.

Natural fertility and available water capacity are high in Downs soils. Permeability is moderate.

Downs soils are well suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa, but such special crops as sweet corn, peas, cabbage, and beets also can be grown. These soils are also suited to pasture, trees, and wildlife habitat.

If these soils are cultivated, contour stripcropping, diversions, terraces, and grassed waterways can be used to help control erosion. Other helpful practices are keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure.

Representative profile of Downs silt loam, 2 to 6 percent slopes, eroded, in a cultivated field (SW¼NW¼ sec. 32, T. 1 N., R. 6 E.):

Ap—0 to 9 inches, very dark brown (10YR 2/2) silt loam; moderate, fine, granular structure; friable; neutral; abrupt, smooth boundary.

A2—9 to 12 inches, dark grayish-brown (10YR 4/2) to brown (10YR 5/3) silt loam; discontinuous bleached silt coats; weak, fine, platy structure; friable; slightly acid; abrupt, smooth boundary.

B1—12 to 18 inches, brown (10YR 4/3) silt loam; discontinuous bleached silt coats; moderate, fine, granular structure; friable; slightly acid; clear, smooth boundary.

B21t—18 to 36 inches, dark yellowish-brown (10YR 4/4) silty clay loam; moderate, fine, subangular blocky structure; firm; thin, discontinuous, dark-brown (10YR 3/3) clay films; medium acid; gradual, smooth boundary.

B22t—36 to 41 inches, brown (10YR 4/3) light silty clay loam; moderate, medium, subangular blocky structure; firm; thin, discontinuous, dark-brown (10YR 3/3) clay films; medium acid; clear, smooth boundary.

B3—41 to 49 inches, yellowish-brown (10YR 5/4) silt loam; moderate, medium, subangular blocky structure; firm; medium acid; gradual, smooth boundary.

C—49 to 60 inches, brown (10YR 5/3) silt loam; massive; firm; many small capillary pores; strongly acid.

The solum ranges from 36 to 55 inches in thickness. The Ap horizon is black (10YR 2/1), very dark brown (10YR 2/2), or brown (10YR 3/2). In places plowing has mixed the A2 horizon with the A1 horizon. Reaction in the subsoil is slightly acid to medium acid.

Downs soils are near Ashdale, Fayette, Palsgrove, and Tama soils. They have a thicker mantle of silt than that of Ashdale and Palsgrove soils and a less clayey subsoil. Downs soils have a surface layer that is thicker and darker colored than that of Fayette soils and thinner than that of Tama soils.

Downs silt loam, 2 to 6 percent slopes, eroded (DoB2).—This soil has the profile described as representative of the series. It is on hillsides and ridgetops in areas of 100 to 135 acres that are irregular in shape. In cultivated areas the plow layer is almost uniformly very dark brown, except in a few areas where the color is darker. Slopes commonly are 100 to 200 feet long. Dolomite or sandstone bedrock generally is at a depth of 50 to 70 inches.

Included with this soil in mapping are a few small areas of somewhat poorly drained Muscatine soils and small areas of nearly level and sloping soils.

Runoff is medium on this Downs soil, and the hazard of further erosion is moderate. Under intensive management that includes practices that help to control erosion, row crops can be grown year after year. Capability unit IIe-1; woodland group 1; wildlife group 1.

Downs silt loam, 6 to 12 percent slopes, eroded (DoC2).—This soil is on the middle parts of slopes in long narrow areas of 50 to 125 acres. In most places dark yellowish-brown material formerly in the subsoil has been mixed with the remaining very dark grayish-brown material in the surface layer. A few narrow drainageways are in the areas. Slopes are 100 to 200 feet long. Limestone or sandstone bedrock generally is at a depth of 50 to 70 inches.

From 6 to 8 inches of the original surface layer of this soil has been lost through water erosion, but the profile otherwise is similar to that described as

representative of the series. Also, the surface layer is less friable, and it is lower in content of organic matter and natural fertility. In addition, it is more difficult to keep this soil in good tilth.

Included with this soil in mapping are small areas of gently sloping soils. Also included are small areas of Palsgrove soils that make up less than 10 percent of the total mapped areas.

This Downs soil is suited to all crops commonly grown in the county. Runoff is moderately rapid, and the hazard of further erosion is severe. Practices are needed that help to control erosion and maintain tilth and fertility. Capability unit IIIe–1; woodland group 1; wildlife group 1.

Downs silt loam, heavy substratum, 0 to 2 percent slopes (DsA).—This soil is on convex crests of ridges on benches in glaciated valleys. The areas are irregular in shape and are 50 to 120 acres in size. In cultivated areas the plow layer is almost uniformly black. Silty clay loam glacial till generally is at a depth of 50 to 70 inches.

The substratum is silty clay loam, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are a few small areas of somewhat poorly drained Muscatine soils and small areas where slopes are 3 or 4 percent.

This Downs soil is suited to all crops commonly grown in the county. If fertility is maintained, this soil can be farmed intensively. Capability unit I–3; woodland group 1; wildlife group 2.

Downs silt loam, heavy substratum, 2 to 6 percent slopes (DsB).—This soil is on hillsides and ridgetops in glaciated valleys. The areas are 50 to 135 acres in size and are irregular in shape. In cultivated areas the plow layer is almost uniformly very dark brown, except in a few concave areas where the color is darker. Slopes are commonly 75 to 125 feet long. Silty clay loam glacial till generally is at a depth of 50 to 70 inches.

This soil has a substratum of silty clay loam, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are a few small areas of Juda soils that are 24 to 40 inches deep. Also included are small areas of nearly level and sloping soils.

Runoff is medium on this Downs soil, and the hazard of erosion is moderate. The soil is suited to all crops commonly grown in the county. Under intensive management that includes practices that help to control erosion, row crops can be grown year after year. Capability unit IIe–1; woodland group 1; wildlife group 2.

Downs silt loam, heavy substratum, 2 to 6 percent slopes, eroded (DsB2).—This soil is on the upper and middle parts of slopes. The areas are long and narrow and range from 50 to 130 acres. In cultivated areas the surface layer is very dark brown or very dark grayish brown. In most areas the subsurface layer has been mixed with the plow layer. Slopes are commonly 75 to 120 feet long. Silty clay loam glacial till is at a depth of 50 to 70 inches.

This soil has a substratum of silty clay loam, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are a few small areas of Juda soils that are 24 to 40 inches deep. Also included are small areas of nearly level and sloping soils.

Runoff is medium on this Downs soil, and the hazard of further erosion is moderate. The soil is suited to all crops commonly grown in the county. Under intensive management that includes practices that help to control erosion, row crops can be grown year after year. Capability unit IIe–1; woodland group 1; wildlife group 2.

Downs silt loam, heavy substratum, 6 to 12 percent slopes, eroded (DsC2).—This soil is in long areas of 50 to 125 acres. Much of the original surface layer of this soil has been washed away. The original surface layer was very dark grayish brown, but in most places dark yellowish-brown material formerly in the subsoil has been mixed with the remaining surface layer. A few narrow drainageways cross the areas. Slopes are 75 to 125 feet long. Silty clay loam glacial till generally is at a depth of 50 to 70 inches.

This soil has a substratum of silty clay loam, but the profile otherwise is similar to that described as representative of the series. About 6 to 8 inches of the original surface layer has been washed away. The remaining surface layer is less friable, lower in fertility and in content of organic matter, and more difficult to keep in good tilth than the original one.

Included with this soil in mapping are small areas of gently sloping and moderately steep soils.

This Downs soil is suited to all crops grown in the county. Runoff is moderately rapid, and the hazard of further erosion is severe. Terracing, contour stripcropping, keeping tillage to a minimum, plowing crop residue into the soil, and use of grassed waterways help to control erosion and to maintain fertility. Capability unit IIIe–1; woodland group 1; wildlife group 2.

Dunbarton Series

The Dunbarton series consists of shallow, well-drained soils that are underlain by dolomite bedrock. Ground water is at a depth of more than 5 feet throughout the year. Dunbarton soils formed under mixed hardwoods, partly in thin loess and partly in clayey material weathered from limestone bedrock.

In a representative profile the surface layer is about 6 inches of dark grayish-brown silt loam. The subsoil, about 9 inches thick, is brown heavy silt loam in the upper 3 inches and dark-brown clay in the lower 6 inches. At a depth of 10 to 20 inches is fractured dolomite bedrock.

Natural fertility and available water capacity are low in these soils. Permeability is moderately slow.

Dunbarton soils are suited to small grains, meadow, pasture, trees, and wildlife habitat. The main crops are corn, oats, and alfalfa. Corn, however, is better suited to the more gently sloping soils than to the steeper ones.

If these soils are cultivated, contour stripcropping and grassed waterways are needed to control erosion. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure are other helpful practices.

Representative profile of Dunbarton silt loam, 6 to 12 percent slopes, eroded, in a cultivated field (SW¼SE¼ sec. 18, T. 2 N., R. 8 E.):

Ap—0 to 6 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, medium, subangular blocky structure; friable; neutral; clear, wavy boundary.

B1—6 to 9 inches, brown (10YR 4/3) heavy silt loam; moderate, medium, subangular blocky structure; friable; slightly acid; clear, wavy boundary.
IIB2t—9 to 15 inches, dark-brown (7.5YR 3/2) clay; strong, fine, angular blocky structure; very firm; thin continuous clay films; neutral; abrupt, wavy boundary.
IIR—15 to 60 inches, shattered dolomite bedrock.

In places a large number of chert fragments are on the surface of these soils. The plow layer is dark grayish brown or dark yellowish brown in color and is 5 to 7 inches thick. In glaciated and in unglaciated areas, the upper part of the subsoil is 2 to 8 inches of silt loam or silty clay loam. If depth to bedrock is less than 15 inches, this layer is missing. In unglaciated areas the lower part of the subsoil is 6 to 10 inches of very dark brown to dark reddish-brown silty clay or clay. In glaciated areas 3 to 5 inches of sandy clay loam or clay loam weathered till is between the silty upper part and the clayey lower part of the subsoil. In places the clayey lower part of the subsoil is missing. Depth to dolomite bedrock is 10 to 20 inches.

Dunbarton soils are similar to Edmund, Northfield, and Sogn soils in that depth to bedrock is no more than 20 inches. Their surface layer is thinner and lighter colored than that of Edmund soils. The Dunbarton soils formed partly in dolomite residuum, but Northfield soils formed entirely in sandstone residuum. Dunbarton soils are deeper to dolomite bedrock than Sogn soils, and they have a subsoil, which is lacking in Sogn soils.

Dunbarton silt loam, 2 to 6 percent slopes, eroded (DuB2).—This soil is on broad ridgetops and the upper parts of slopes in areas of 115 to 265 acres. Slopes are smooth and convex and are 150 to 200 feet long. The surface layer of this Dunbarton soil is slightly thicker than the one described as representative for the series.

Included with this soil in mapping are small areas of NewGlarus soils. Also included are some small areas of soils that have slopes of 6 to 8 percent. Runoff is rapid on these steeper soils, and the hazard of erosion is severe.

If this Dunbarton soil is managed properly, row crops and all other crops common to the county can be grown. Shallowness to bedrock, low available water capacity, the clayey subsoil, and slope limit use. Practices are needed that control erosion, minimize runoff, conserve moisture, and maintain or improve tilth and fertility. Capability unit IIIe-3; woodland group 5; wildlife group 3.

Dunbarton silt loam, 6 to 12 percent slopes, eroded (DuC2).—This soil has the profile described as representative of the series. The areas are long and narrow and are 120 to 245 acres in size. They are on the middle parts of slopes. A few narrow drainageways cross the areas. Slopes are smooth and convex and are 75 to 125 feet long.

Included with this soil in mapping are areas of Sogn soils and of soils that have a thin layer of glacial till over bedrock.

If this Dunbarton soil is managed properly, certain row crops can be grown in the cropping system. This soil is suited to small grains, meadow, pasture, trees, and wildlife habitat. The slope, shallowness to bedrock, and limited available water capacity restrict use. Practices are needed that help to control erosion, conserve moisture, and maintain tilth and fertility. Capability unit IVe-3; woodland group 5; wildlife group 3.

Dunbarton silt loam, 12 to 20 percent slopes, eroded (DuD2).—This soil is on the lower parts of slopes in narrow areas of 50 to 120 acres. Small drainageways are common in this soil. Slopes are 50 to 100 feet long. In places areas of this soil are wooded.

This soil is slightly thinner over dolomite, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are small areas of Sogn soils and areas of soils that have a thin layer of glacial till over bedrock. Also included are a few small areas where erosion is severe, the soil is poor in tilth, and the content of organic matter is low. Other included areas consist of Chaseburg soils and of Fayette silt loam, valleys, which are at the bases of slopes and in drainageways.

This Dunbarton soil is suited to forage crops, pasture, trees, and wildlife habitat. The moderately steep slopes, very severe hazard of further erosion, and limited thickness of the soil over bedrock restrict use. Pasture renovation and planting of trees are ways to help to control erosion and conserve moisture. Capability unit VIe-3; woodland group 5; wildlife group 3.

Dunbarton silt loam, 20 to 30 percent slopes, eroded (DuE2).—This soil is on the lower parts of slopes in narrow areas of 50 to 115 acres. Small drainageways are common. Slopes are 50 to 150 feet long. In places topsoil has accumulated at the base of slopes. Areas of this soil are wooded.

This soil is slightly thinner over dolomite, but the profile otherwise is similar to that described as representative of the series. The surface layer is brown or dark grayish brown.

Included with this soil in mapping are small areas of Sogn soils and small areas where the plow layer is severely eroded. In the latter areas the soil is low in content of organic matter and poor in tilth. Also included are small areas of Fayette soils in valleys, small areas of Chaseburg soils, and areas where slopes are 30 to 45 percent.

This soil is suited to pasture, trees, and wildlife habitat. Use of this soil is restricted because of steep slopes, very severe hazard of further erosion, and shallow depth to bedrock. Controlling grazing and planting trees are helpful practices. Capability unit VIIe-3; woodland group 5; wildlife group 3.

Dunbarton silty clay loam, 10 to 20 percent slopes, severely eroded (DvD3).—This soil is on the middle and lower parts of hillsides in areas of 5 to 15 acres. Drainageways commonly cross the areas. Slopes are 100 to 150 feet long.

This soil has a surface layer of dark-brown or dark yellowish-brown silty clay loam that is 5 or 6 inches thick, but the profile otherwise is similar to that described as representative of the series. Much of the subsoil has been plowed into the surface layer.

The content of organic matter is low, and the soil is in very poor tilth. Because of the low infiltration rate, runoff is rapid. Permeability is low in the subsoil.

Included with this soil in mapping are a few areas of Sogn soils. Sogn soils are very shallow, and they do not have a subsoil.

Use of this soil is restricted because of severe erosion, high runoff, and low available water capacity. The hazard of further erosion is very severe.

This soil is suited to pasture, trees, and wildlife habitat. Pasture renovation helps to control erosion and conserve moisture. Planting trees, controlling grazing, and planting special vegetation for wildlife habitat are

other helpful practices. Capability unit VIIe-3; woodland group 6; wildlife group 3.

Durand Series

The Durand series consists of deep, well-drained soils on glaciated uplands. Ground water in these soils is at a depth of more than 5 feet throughout the year.

Durand soils formed under prairie grasses in moderately deep loess and loamy glacial till. The loess, which is 15 to 30 inches thick, is underlain by till that is more than 60 inches thick.

In a representative profile the surface layer and subsurface layer are about 12 inches of silt loam. The subsoil, about 52 inches thick, is dark yellowish-brown silty clay loam in the upper 11 inches. The lower 41 inches is reddish-brown clay loam in the upper part and dark-brown clay loam in the lower part. It is underlain by brown, calcareous, loamy till.

Natural fertility and available water capacity are high in these soils. Permeability is moderate.

These soils are suited to corn, oats, and alfalfa and to all other crops commonly grown in the county. They are suited also to meadow, pasture, and wildlife habitat. Contour stripcropping, diversions, terraces, and grassed waterways help to control erosion in cultivated areas. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure are other helpful practices.

Representative profile of Durand silt loam, 6 to 12 percent slopes, eroded, in a plowed field (NW¼SW¼ sec. 2, T. 1 N., R. 7 E.):

Ap—0 to 9 inches, very dark gray (10YR 3/1) silt loam; weak, fine, granular structure; friable; neutral; clear, wavy boundary.

A3—9 to 12 inches, very dark grayish brown (10YR 3/2) heavy silt loam; moderate, fine, subangular blocky structure; friable; neutral; clear, wavy boundary.

B21t—12 to 23 inches, dark yellowish-brown (10YR 4/4) silty clay loam; moderate, fine, subangular blocky structure; firm; thin, discontinuous, dark-brown (10YR 3/3) clay films; medium acid; clear, wavy boundary.

IIB22t—23 to 40 inches, reddish-brown (5YR 4/4) clay loam; moderate, fine, subangular blocky structure; firm; thin continuous clay films; medium acid; clear, wavy boundary.

IIB23t—40 to 57 inches, dark-brown (7.5YR 4/4) clay loam; moderate, medium, subangular blocky structure; firm; patchy clay films on vertical and horizontal ped faces; medium acid; clear, wavy boundary.

IIB3—57 to 64 inches, dark-brown (7.5YR 4/4) clay loam; moderate, medium, subangular blocky structure; firm; patchy clay films on vertical ped faces only; medium acid; clear, wavy boundary.

IIC—64 to 84 inches, brown (10YR 5/3) loam; massive; hard, friable; moderately alkaline; effervescent.

The solum ranges from 60 to 100 inches in thickness. The surface layer is black (10YR 2/1), very dark grayish brown (10YR 3/2), or very dark gray (10YR 3/1). The subsurface layer is very dark grayish brown to dark brown. It has blocky or granular structure. The upper part of the subsoil is heavy silt loam or silty clay loam, and the lower part is sandy clay loam or clay loam. The lower part of the Bt horizon contains 20 percent less clay than the upper part. In places mottles are between depths of 36 and 60 inches. The underlying calcareous till is sandy loam or loam. In places dolomite bedrock is at a depth of 5 to 10 feet.

Durand soils are below Ogle soils, near Pecatonica and Saybrook soils, and above and adjacent to Winnebago soils. In Durand soils a smaller part of the subsoil formed in loess than in Ogle soils. Durand soils have a darker colored surface layer than that of Pecatonica soils, and their solum is thicker than that of Saybrook soils. In Durand soils part of the subsoil formed in glacial till, but in Winnebago soils nearly all of the subsoil formed in this kind of material.

Durand silt loam, 2 to 6 percent slopes, eroded (DwB2).—This soil is on ridgetops and the upper parts of slopes. It is in long, narrow areas of 65 to 165 acres. Slopes are 150 to 250 feet long. The plow layer in cultivated areas is almost uniformly black, but in a few areas it is very dark brown.

Except for the black and very dark brown surface layer, the profile of this soil is similar to that described as representative of the series. Areas of eroded soil are poorer in tilth and lower in content of organic matter than areas of uneroded soil.

Included with this soil in mapping are small areas of Ogle silt loam and a few small areas where the soil is moderately well drained.

If this soil is managed properly, it is well suited to all crops commonly grown in the county. Use is limited only by the moderate hazard of further erosion. Major management concerns are maintaining the content of organic matter, maintaining tilth, raising the level of natural fertility, and controlling erosion. Capability unit IIe-1; woodland group 12; wildlife group 4.

Durand silt loam, 6 to 12 percent slopes, eroded (DwC2).—This soil has the profile described as representative of the series. Areas are almost uniform in shape, and they are 50 to 125 acres in size. Slopes are slightly convex, and they are 100 to 150 feet long. In cultivated areas the plow layer is very dark gray and 6 to 8 inches thick. In places this layer is very dark brown or dark brown.

Included with this soil in mapping are areas of Winnebago silt loam and areas of moderately steep soils.

If this soil is managed properly, it is suited to all crops commonly grown in the county. Use is limited only by the severe hazard of further erosion. Major management concerns are controlling erosion, maintaining the content of organic matter, maintaining tilth, and raising the level of natural fertility. Capability unit IIIe-1; woodland group 12; wildlife group 4.

Edmund Series

The Edmund series consists of shallow, well-drained soils that are underlain by dolomite bedrock. Ground water in these soils is at a depth of 5 feet throughout the year.

Edmund soils formed under prairie grasses, partly in thin loess and partly in clayey material weathered from dolomite bedrock. Fractured limestone is at a depth of 10 to 20 inches.

In a representative profile the surface layer is about 7 inches of black silt loam. The subsoil is about 9 inches of reddish-brown silty clay. It is underlain by fractured dolomite. The cracks of the dolomite are filled with clay.

Natural fertility and available water capacity are low in these soils. Permeability is moderately slow.

These soils are poorly suited to deep-rooted crops such as corn and alfalfa. They are suited to small grains, meadow, pasture, and wildlife habitat.

If these soils are cultivated, contour stripcropping and grassed waterways help to control erosion. Keeping

tillage to a minimum, returning crop residue to the soil, applying barnyard manure, and renovating pasture are other helpful practices.

Representative profile of Edmund silt loam, 6 to 12 percent slopes, eroded, in a cultivated field (NW¼SW¼ sec. 13, T. 1 N., R. 7 E.):

Ap—0 to 7 inches, black (10YR 2/1) silt loam; moderate, fine, subangular blocky structure; friable; neutral; clear, wavy boundary.

IIB21t—7 to 16 inches, reddish-brown (5YR 4/4) silty clay; moderate, medium, subangular blocky structure; very firm; thin continuous clay films; medium acid; gradual, wavy boundary.

R—16 to 60 inches, partly shattered and disintegrated dolomite bedrock.

The Ap horizon ranges from 6 to 8 inches in thickness; and it is black (10YR 2/1), very dark grayish brown (10YR 3/2), or dark brown (10YR 3/3) in color. It is underlain by 2 to 14 inches of dark-red (2.5YR 3/6) to dark-brown 7.5YR 4/4) clay loam to clay. A 2- to 4-inch layer of clay loam or sandy clay loam is above the clayey residuum in areas where these soils are adjacent to glacial soils. Glacial pebbles are on the surface in these areas.

Edmund soils are near Dunbarton, Dodgeville, Northfield, and Sogn soils. Edmund soils have a darker surface layer than Dunbarton soils. They are shallower to bedrock than Dodgeville soils, but they are deeper to bedrock than Sogn soils. Generally in Edmund soils, as in Northfield and Sogn soils, bedrock is at a depth of less than 20 inches. The Edmund soils are underlain by dolomite, however, and the Northfield soils are underlain by sandstone.

Edmund silt loam, 2 to 6 percent slopes, eroded (EdB2).—This soil is on uplands in areas of 75 to 165 acres on broad ridgetops and the upper parts of slopes. Slopes are smooth and convex, and they are 150 to 200 feet long.

This soil is slightly deeper to bedrock, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are small areas of Dodgeville soils and small areas where slopes are 6 to 8 percent.

If this soil is managed properly, it is suited to certain row crops and to all other crops commonly grown in the county. Its use is limited mostly by slope, shallow depth, low available water capacity, and the clayey subsoil. Helpful practices are those that control erosion, control runoff, conserve moisture, and maintain or improve tilth and fertility. Capability unit IIIe-3; woodland group 5; wildlife group 3.

Edmund silt loam, 6 to 12 percent slopes, eroded (EdC2).—This soil has the profile that is described as representative of the series. Areas are on the middle and lower parts of hillsides, and they are 70 to 125 acres in size. Small drainageways are common. Slopes are 100 to 150 feet long. Included in mapping are a few areas of Sogn soils.

Use of this soil is limited by slope, erosion, high runoff, and low available water capacity. The hazard of further erosion is severe. Contour stripcropping and the use of grassed waterways help to control erosion. Other helpful practices are those that improve tilth, increase the content of organic matter, and conserve moisture. Capability unit IVe-3; woodland group 5; wildlife group 3.

Edmund silt loam, 12 to 20 percent slopes, eroded (EdD2).—This soil is in narrow areas of 40 to 85 acres on the lower parts of hillsides. In places topsoil has accumulated at the bases of slopes. Small drainageways commonly cross the areas. Slopes are 50 to 100 feet long. The surface layer is very dark grayish brown.

This soil is slightly shallower to bedrock, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are small areas of Sogn soils and areas where the plow layer is severely eroded. Soil in these areas is low in content of organic matter and poor in tilth. Also included, at the bases of slopes and in downslope drainageways, are small areas of Huntsville and Lindstrom soils.

This soil is suited to forage, pasture, and wildlife habitat. Use of this soil is limited by slope, shallow depth, low available water capacity, and the clayey subsoil. The hazard of further erosion is very severe. Helpful practices are those that control erosion, control runoff, conserve moisure, and maintain or improve tilth and fertility. Capability unit VIe-3; woodland group 5; wildlife group 3.

Eleva Series

Soils of the Eleva series are moderately deep and well drained. They are underlain by sandstone. Ground water is at a depth of more than 5 feet throughout the year. These soils formed under mixed hardwoods in material weathered from sandstone bedrock.

In a representative profile the surface layer is about 3 inches of black sandy loam, and the subsurface layer is about 5 inches of brown sandy loam. The subsoil, about 24 inches thick, is brown sandy loam in the upper and lower parts and brown loam in the middle part. It is underlain by about 7 inches of yellowish-brown sand, which, in turn, is underlain by sandstone bedrock.

Natural fertility and available water capacity are moderate in these soils. Permeability is moderately rapid. Reaction is strongly acid or medium acid, except in areas where lime has been applied.

Lack of moisture late in summer affects growth of crops in these soils. High-level management helps to improve the quality and increase the quantity of crops. The available water capacity is limited, and practices are needed that help to retain water in the soil. Contour stripcropping and diversion help to control erosion. Keeping tillage to a minimum and returning crop residue to the soil help to conserve moisture and maintain or increase the content of organic matter in the surface layer.

An undisturbed profile within an area of Eleva sandy loam, 6 to 12 percent slopes, eroded (SE¼NW¼ sec. 29, T. 4 N., R. 8 E.):

A1—0 to 3 inches, black (10YR 2/1) sandy loam; weak, medium, granular structure; very friable; medium acid; abrupt, wavy boundary.

A2—3 to 8 inches, brown (10YR 5/3) sandy loam; weak, thin, platy structure; very friable; medium acid; abrupt, wavy boundary.

B1—8 to 15 inches, brown (10YR 4/3) sandy loam; weak, medium, subangular blocky structure; friable; medium acid; clear, wavy boundary.

B2t—15 to 26 inches, brown (10YR 4/3) light loam; moderate, medium, subangular blocky structure; firm; thin, discontinuous, dark yellowish-brown (10YR 4/4) clay films; strongly acid; clear, wavy boundary.

B3—26 to 32 inches, brown (7.5YR 4/4) sandy loam; weak, coarse, subangular blocky structure; very friable; medium acid; clear, wavy boundary.

C—32 to 39 inches, yellowish-brown (10YR 5/6) sand; single grained; loose; strongly acid; clear, wavy boundary.
IIR—39 to 60 inches, yellowish-brown (10YR 5/4) sandstone bedrock.

The Ap horizon ranges from 6 to 9 inches in thickness, and it is dark gray (10YR 4/1), dark grayish brown (10YR 4/2), or brown (10YR 4/3) in color. In places the A2 horizon has been mixed with the A1 horizon. The subsoil is dark yellowish-brown (10YR 4/4) to strong-brown (7.5YR 5/6) sandy loam to light sandy clay loam. Sandstone bedrock is at a depth of 20 to 40 inches. The bedrock ranges in color from yellowish brown (10YR 5/4) to yellowish red (5YR 5/8).

Eleva soils are above areas of Elkmound soils and above areas of Steep stony and rocky land. Eleva, Elkmound, Sylvester, and Hixton soils all are underlain by sandstone at a depth of less than 40 inches. The Eleva soils are deeper to sandstone bedrock than Elkmound soils, however, and their subsoil is coarser textured than that of Hixton soils. The surface layer of Eleva soils is thinner, lighter colored, and coarser textured than that of Sylvester soils.

Eleva sandy loam, 6 to 12 percent slopes, eroded (EeC2).—This soil has the profile described for the series. The areas are narrow and are on the middle parts of hillsides. They are 10 to 25 acres in size. Slopes are smooth and convex and are 100 to 175 feet long. A few narrow drainageways commonly cross the areas. In cultivated areas the plow layer is dark grayish brown or brown, and it is 6 to 8 inches thick. Included in mapping are areas of Elkmound soils.

If this soil is managed properly, it is suited to small grains, pasture, trees, and wildlife habitat. Moisture needs to be conserved and erosion controlled because of the limited available water capacity, severe hazard of further erosion, and moderate depth to bedrock. Capability unit IIIe–7; woodland group 3; wildlife group 1.

Eleva sandy loam, 12 to 20 percent slopes, eroded (EeD2).—This soil is on the lower parts of hillsides in long, narrow areas of 10 to 35 acres. In cultivated areas the plow layer is brown and about 6 inches thick. Small drainageways are common on this soil. Slopes are 50 to 100 feet long.

This soil is only 20 to 30 inches thick over sandstone, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are small areas of Elkmound soils and areas of soil similar to this Eleva soil except that it is severely eroded. Also included in places are small areas of Fayette soils in valleys, and Chaseburg soils at the bases of slopes and in drainageways.

This Eleva soil is well suited to forage crops, pasture, trees, and wildlife habitat. Serious management concerns are moderately coarse texture, a very severe hazard of further erosion, and limited thickness over bedrock. Practices that help to control erosion and conserve moisture are needed where this soil is used for meadow or pasture. Pasture renovation and construction of grassed waterways are useful practices. Capability unit IVe–7; woodland group 3; wildlife group 1.

Elkmound Series

The Elkmound series consists of shallow, well-drained soils in the unglaciated northern and western parts of the county. These soils are underlain by sandstone. Ground water is at a depth of more than 5 feet throughout the year. Most areas of these soils are lower than associated soils that are underlain by dolomite.

Elkmound soils formed under thin stands of mixed hardwoods in material weathered from sandstone. The hardwoods have an understory of prairie grasses.

In a representative profile the surface layer is about 2 inches of black sandy loam, and the subsurface layer is about 2 inches of brown sandy loam. The subsoil is about 13 inches of dark yellowish-brown sandy loam and loamy sand. It is underlain by light yellowish-brown sandstone bedrock.

Available water capacity and natural fertility are low in these soils. Permeability is moderately rapid.

These soils are suited to crops. The main crops are oats, alfalfa, and bluegrass. Many areas of this soil are idle or are in trees. The soils are suited to trees, pasture, and wildlife habitat.

If these soils are cultivated, contour stripcropping and grassed waterways are needed to control erosion. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure are other helpful practices. Areas of these soils used for pasture can be renovated. Planting of trees is helpful in the development of wooded areas, and special plantings are helpful in areas that are to be used as wildlife habitat.

An undisturbed profile within an area of Elkmound sandy loam, 6 to 12 percent slopes, eroded (SE¼NW¼ sec. 18, T. 3 N., R. 7 E.):

A1—0 to 2 inches, black (10YR 2/1) sandy loam; weak, fine, granular structure; very friable; slightly acid; abrupt, wavy boundary.
A2—2 to 4 inches, brown (10YR 5/3) sandy loam; weak, thin, platy structure; very friable; medium acid; abrupt, wavy boundary.
B2—4 to 15 inches, dark yellowish-brown (10YR 4/4) sandy loam; weak, medium, subangular blocky structure; friable; medium acid; clear, wavy boundary.
B3—15 to 17 inches, yellowish-brown (10YR 5/4) loamy sand; weak, coarse, subangular blocky structure; very friable; strongly acid; clear, wavy boundary.
IIR—17 to 60 inches, light yellowish-brown (10YR 6/4) sandstone bedrock.

The Ap horizon ranges from 5 to 7 inches in thickness, and it is dark grayish-brown (10YR 4/2) or brown (10YR 4/3) in color. In cultivated areas the A2 horizon has been completely incorporated into the Ap horizon by plowing. Depth to sandstone bedrock ranges from 10 to 20 inches.

Elkmound, Dunbarton, Eleva, and Northfield soils are all underlain by bedrock at a depth of less than 40 inches. The Elkmound soils are underlain by sandstone, however, and the Dunbarton soils are underlain by dolomite. Elkmound soils are shallower to bedrock than Eleva soils. They are slightly coarser textured than Northfield soils.

Elkmound sandy loam, 2 to 6 percent slopes, eroded (ElB2).—This soil is on narrow ridgetops and the upper parts of hillsides. It is underlain by sandstone at a depth slightly more than that in the representative profile. Areas are 35 to 65 acres in size. Slopes are smooth and convex, and they are 100 to 150 feet long. In cultivated areas the surface layer is very friable, blocky, dark grayish-brown sandy loam.

Included with this soil in mapping are small areas of Eleva and Northfield soils and, in places, small areas where slopes are 6 to 8 percent.

If this soil is managed properly, it is suited to certain row crops and to all other crops commonly grown in the county. Major limitations to use are slope, shallowness to bedrock, low available water capacity, and sandy tex-

ture. Helpful practices are those that control erosion, control runoff, conserve moisture, and maintain or improve tilth and natural fertility. Capability unit IIIe–3; woodland group 5; wildlife group 3.

Elkmound sandy loam, 6 to 12 percent slopes, eroded (EIC2).—This soil has the profile described for the series. It is on the middle parts of hillsides in narrow areas of 30 to 60 acres. Slopes are smooth and convex and are 100 to 175 feet long. A few narrow drainageways cross the areas. The surface layer is black; but in cultivated areas the plow layer is 5 to 7 inches of very friable, blocky, dark grayish-brown sandy loam.

Included with this soil in mapping are areas of Eleva and Northfield soils.

This soil is not well suited to crops, but under good management certain row crops and all other common crops of the county can be grown. Major limitations to use are slope, shallow depth to bedrock, low available water capacity, and the sandy subsoil. Helpful practices are those that control erosion and runoff, conserve moisture, and maintain or improve tilth and fertility. Capability unit IVe–3; woodland group 5; wildlife group 3.

Elkmound sandy loam, 12 to 20 percent slopes, eroded (EID2).—This soil is on the lower parts of hillsides in narrow areas of 25 to 45 acres. In places topsoil from higher areas has accumulated at the bases of slopes. Small drainageways commonly cut the areas. Slopes are 50 to 100 feet long. The profile of this soil is similar to the one described as representative for the series except that the surface layer is dark grayish brown. The plow layer in cultivated areas is dark grayish brown, and it is very friable.

Included with this soil in mapping are small areas of Northfield soils and, in places at the bases of slopes and in drainageways, small areas of Fayette soils in valleys.

This soil is suited to forage crops, pasture, trees, and wildlife habitat. Major restrictions to use are slope, shallow depth to sandstone, low available water capacity, and the sandy subsoil. Renovating pasture, controlling grazing, planting trees, and improving wildlife habitat are helpful practices. Capability unit VIe–3; woodland group 5; wildlife group 3.

Elkmound sandy loam, 20 to 30 percent slopes, eroded (EIE2).—This soil is on the lower parts of hillsides in narrow areas of 10 to 25 acres. Small drainageways are common. Slopes are 50 to 100 feet long. Many areas of this soil are wooded or are idle. The profile of this soil is similar to the one described as representative of the series except that the surface layer is dark grayish brown, but in cultivated areas the plow layer is brown.

Included with this soil in mapping are small areas of Northfield soils and areas of soils that are severely eroded. The severely eroded soils are low in content of organic matter and poor in tilth. Also included are areas of Fayette soils in valleys at the bases of slopes and in downslope drainageways.

This soil is suited to limited pasture, trees, and wildlife habitat. The major restrictions to use are slope, shallowness to sandstone, low available water capacity, and the sandy subsoil. Practices that control erosion, control runoff, conserve moisture, and maintain or improve tilth and fertility are helpful. Capability unit VIIe–3; woodland group 5; wildlife group 3.

Elkmound sandy loam, 30 to 45 percent slopes (EIF).—This soil is on the lower parts of hillsides in narrow areas of 10 to 25 acres. The surface layer is dark grayish brown. Small drainageways are common. Slopes are 50 to 100 feet long. Most of this soil is wooded.

This soil is shallower to bedrock, but the profile otherwise is similar to that described for the series.

Included with this soil in mapping are small areas of Steep stony and rocky land and, in places, small areas of Northfield soils. Also included, in places, are small areas of Fayette soils in valleys at the bases of slopes and in downslope drainageways.

This soil is suited to trees and wildlife habitat. Major restrictions to use are shallow depth, low available water capacity, and the sandy subsoil. Planting trees and planting special vegetation suitable for wildlife are helpful practices. Capability unit VIIe–3; woodland group 5; wildlife group 3.

Ettrick Series

The Ettrick series consists of deep, poorly drained soils on low benches in valleys. Ground water is at or near the surface most of the year. These soils formed under sedges and grass in old silty alluvium and alluvial silt and sand. Stratified alluvium is at a depth of 3 to 5 feet.

In a representative profile the surface layer is about 8 inches of black silt loam. The subsurface layer, about 5 inches thick, is also black silt loam. The subsoil is about 39 inches thick and is gray and olive gray. The upper 22 inches is silty clay loam that has strong-brown mottles. The lower 17 inches is mildly alkaline silty clay loam and loam. It is underlain by olive-gray silt and sand.

Available water capacity is high, and natural fertility is moderately high in Ettrick soils. Permeability is moderately slow. The content of organic matter in the surface layer is high.

Flooding occurs frequently on these soils, especially after periods of heavy rainfall. Small depressions retain water long enough to seriously interfere with tillage and restrict production of crops. Where adequate outlets are available, these soils are suited to either tile or open-ditch drainage.

If these soils are protected from flooding and are artificially drained, they are suited to all crops commonly grown in the county. Alsike and Ladino clover can be grown instead of alfalfa in areas that are not thoroughly drained. Soils in undrained areas are better suited to limited pasture and wildlife habitat than to other uses. These soils warm slowly in spring and cool quickly in fall. Providing adequate drainage helps to raise soil temperature and increase growth of crops in spring. Proper timing of tillage operations and keeping these operations to a minimum, returning crop residue to the soil, and applying barnyard manure are other helpful practices.

Representative profile of Ettrick silt loam in a cultivated field (SE¼SW¼ sec. 34, T. 2 N., R. 6 E.):

Ap—0 to 8 inches, black (10YR 2/1) silt loam; moderate, fine, granular structure; friable; neutral; abrupt, wavy boundary.

A3—8 to 13 inches, black (N 2/0) silt loam; common, fine, prominent, strong-brown (7.5YR 5/6) mottles; moderate, fine, subangular blocky structure; friable; neutral; clear, wavy boundary.

B1—13 to 22 inches, olive-gray (5Y 5/2) silty clay loam; common, medium, prominent, strong-brown (7.5YR 5/6) mottles; moderate, fine, subangular blocky structure; firm when moist, slightly sticky when wet; mildly alkaline; gradual, smooth boundary.

B21tg—22 to 35 inches, dark-gray (5Y 4/1) silty clay loam; common, medium, prominent, strong-brown (7.5YR 5/6) mottles; moderate, medium, subangular blocky structure; firm; thin discontinuous clay films; mildly alkaline; gradual, smooth boundary.

I&IIB22tg—35 to 40 inches, gray (5Y 5/1) silty clay loam that contains moderate amounts of medium sand; moderate, medium, subangular blocky structure; firm; patchy clay films on horizontal and vertical faces of peds; neutral; gradual, smooth boundary.

IIB3—40 to 52 inches, olive-gray (5Y 4/2) heavy loam; weak, medium, subangular blocky structure; firm; moderately alkaline; gradual, smooth boundary.

IIC—52 to 70 inches, olive-gray (5Y 4/2) stratified silt and layers of very fine sand are at a depth of more than 36 inches.

The Al and A3 horizons are very dark gray (10YR 3/1) or black (10YR 2/1 or N 2/0) silt loam or silty clay loam. Their combined thickness is 11 to 19 inches. The silty alluvium ranges from 24 to 36 inches in thickness. The lower part of the subsoil is 6 to 18 inches of silt loam or loam. In areas where frequent flooding has occurred, light-colored silty material has been deposited on the surface. In places thin layers of very fine sand are at a depth of more than 36 inches.

Ettrick soils are similar to Marshan, Muscatine, and Ossian soils in that they have a high content of silt. Ettrick soils, like Marshan and Ossian soils, are poorly drained. They have a thicker mantle of silt than Marshan soils, and their underlying alluvium is not so sandy. Ettrick soils are more poorly drained than Muscatine soils, and they have more sand in the lower part of the subsoil than the Muscatine soils. The lower part of the subsoil in Ettrick soils formed in loamy alluvium, but Ossian soils formed entirely in silt.

Ettrick silt loam (0 to 2 percent slopes) (Et).—This is the only soil of the Ettrick series mapped in the county. It is in irregularly shaped areas of 30 to 150 acres on low benches near streams. Water ponds on this soil in small depressions.

Included with this soil in mapping are small areas of Muscatine, Orion, Otter, and Stronghurst soils.

Use of this soil is restricted by wetness. If the soil is adequately drained, however, it is suited to all crops commonly grown in the county. Major management concerns are providing adequate drainage, raising the level of fertility, and maintaining tilth. Capability unit IIw-1; woodland group 7; wildlife group 5b.

Fayette Series

The Fayette series consists of deep, well-drained soils on uplands, valley slopes, and benches throughout the county. Ground water is at a depth of more than 5 feet throughout the year. These soils formed under mixed hardwoods in 4 to 12 feet of deep, silty loess.

Two topographic phases of Fayette silt loams—benches and valleys—are recognized. Also recognized is a loamy substratum phase of Fayette silt loams. Other Fayette silt loams are on broad ridgetops, and they are underlain by bedrock of dolomite and sandstone. The silt loams on benches are at moderately high elevation. They are underlain by outwash sand that is medium acid to neutral in reaction. In places gravel is present in these soils. The silt loams in valleys are on concave valley slopes below ridges of steep bedrock and above benches. The silt loams that have a loamy substratum are on high glaciated uplands and benches. They are underlain by loamy glacial till.

In a representative profile the surface layer is 7 inches of dark grayish-brown silt loam. The subsurface layer is about 4 inches of brown silt loam. The subsoil, about 39 inches thick, is yellowish-brown silt loam in the upper and lower parts and brown silty clay loam between depths of 18 and 36 inches. It is underlain by yellowish-brown silt loam.

Available water capacity and natural fertility are high in Fayette soils. Permeability is moderate.

Fayette soils are well suited to all crops commonly grown in the county, and they are well suited to such special crops as sweet corn, snap beans, and cucumbers. They also are well suited to pasture, trees, and wildlife habitat.

If these soils are well managed, they can be cultivated intensively. Topography imposes the only limitation to use. Use of contour stripcropping, diversions, terraces, and grassed waterways helps to control erosion. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure are other helpful practices.

Representative profile of Fayette silt loam, 6 to 12 percent slopes, eroded, in a cultivated field (SE¼SE¼ sec. 30, T. 1 N., R. 6 E.):

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine, granular structure; friable; mildly alkaline; abrupt, wavy boundary

A2—7 to 11 inches, brown (10YR 5/3) silt loam; moderate, medium, platy structure; friable; slightly acid; abrupt, wavy boundary.

B1—11 to 18 inches, yellowish-brown (10YR 5/4) silt loam; moderate, fine, subangular blocky structure; friable; thick bleached silt coats; slightly acid; clear, wavy boundary.

B21t—18 to 27 inches, brown (10YR 4/3) light silty clay loam; moderate, fine, subangular blocky structure; firm; thin, discontinuous, dark yellowish-brown (10YR 4/4) clay films; strongly acid; clear, wavy boundary.

B22t—27 to 36 inches, brown (10YR 4/3) silty clay loam; moderate, medium, subangular blocky structure; firm; thin, discontinuous, dark-brown (7.5YR 4/4) clay films; strongly acid; clear, wavy boundary.

B23t—36 to 41 inches, yellowish-brown (10YR 5/4) heavy silt loam; moderate, medium, subangular blocky structure; firm; patchy clay films; strongly acid; clear, wavy boundary.

B3—41 to 50 inches, yellowish-brown (10YR 5/6) silt loam; moderate, coarse, subangular blocky structure; firm; medium acid; clear, wavy boundary.

C1—50 to 65 inches, yellowish-brown (10YR 5/4) silt loam; massive; friable; vesicular; slightly acid; clear, wavy boundary.

C2—65 to 75 inches, brown (10YR 5/3) to yellowish-brown (10YR 5/4) silt loam; weak, medium, platy structure; friable; vesicular; neutral.

The plow layer is dark grayish-brown (10YR 4/2) or brown (10YR 4/3) in color. In places the A2 horizon has been completely incorporated into the Ap horizon by plowing. The silt mantle ranges from 50 to more than 70 inches in thickness and the subsoil from 30 to 40 inches. In places the subsoil is mottled in the lower part.

Fayette soils are near Cadiz, Dodge, Palsgrove, and Stronghurst soils. They have a lighter colored and thinner surface layer than that of Downs and Tama soils, though they formed in material similar to that in which those soils formed. Fayette soils have a thicker silt mantle than that of Cadiz, Dodge, and Palsgrove soils, which formed partly in residuum or till. Fayette soils are similar to but better drained than Stronghurst soils.

Fayette silt loam, 2 to 6 percent slopes, eroded (FaB2).—This soil is on ridgetops and knolls. Areas are 75 to 135 acres in size and irregular in shape. In cultivated areas the plow layer is mostly dark gray or dark grayish brown, but in a few areas where slopes are concave it is darker. Slopes are commonly 175 to 225 feet long. Dolomite or sandstone bedrock is at a depth of 50 to more than 70 inches.

The surface layer of this soil is slightly thicker, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are a few small areas where the soil is moderately well drained. Also included are areas of nearly level and sloping soils.

This soil is well suited to all crops commonly grown in the county. Lime is required for good growth of legumes. If management is intensive and erosion is controlled, continuous row crops can be grown. Runoff is medium. Use of this soil is limited only by a moderate hazard of erosion. Capability unit IIe–1; woodland group 1; wildlife group 1.

Fayette silt loam, 6 to 12 percent slopes, eroded (FaC2).—This soil has the profile described as representative of the series. It is on smooth hillsides. Areas are 65 to 100 acres in size and nearly uniform in shape. The surface layer is dark grayish brown, but it includes areas of dark yellowish-brown material that was formerly in the subsoil. A few narrow drainageways cross the areas. Slopes are 100 to 200 feet long. Depth to dolomite or sandstone bedrock is 50 to more than 70 inches.

Included with this soil in mapping are small areas of gently sloping and moderately steep soils. Also included and making up less than 10 percent of the total acreage are areas of Palsgrove soils.

This soil is suited to all crops commonly grown in the county. Lime is needed for good growth of legumes. Runoff is moderately rapid, and the hazard of further erosion is severe. Practices that minimize the hazard of erosion are helpful. Capability unit IIIe–1; woodland group 1; wildlife group 1.

Fayette silt loam, 12 to 20 percent slopes, eroded (FaD2).—This soil is on the smooth lower parts of hillsides in areas of 40 to 80 acres. The original surface layer was dark grayish brown, but in most areas dark yellowish-brown material that was formerly in the subsoil has been mixed with it. A few narrow drainageways cross the areas. Slopes are mainly 100 to 150 feet long. Dolomite or sandstone bedrock is at a depth of 50 to more than 70 inches.

Water has washed away 2 to 8 inches of the original surface layer of this soil. The present plow layer is less friable, lower in fertility, lower in content of organic matter, and more difficult to keep in good tilth than that of the soil described as representative of the series. The subsoil is about 35 inches thick.

Included with this soil in mapping are small areas where slopes are less than 12 percent or more than 20 percent. Also included are small areas of Chaseburg and Arenzville soils along narrow drainageways, and small areas of Palsgrove soils.

Much of this soil is in pasture or trees. If the level of management is high, crops common to the county grow well in it. Runoff is rapid, and the hazard of erosion is very severe. This soil has good potential for many species of trees. It is especially well suited to walnut and oak. Slopes that face south and southwest are not so well suited to trees as slopes that face other directions. Capability unit IVe–1; woodland group 1; wildlife group 1.

Fayette silt loam, benches, 0 to 2 percent slopes (FbA).—This soil is on nearly level benches in valleys. Areas are irregular in shape and 80 to 160 acres in size. In cultivated areas the plow layer generally is dark gray, but it is darker in a few areas where slopes are concave.

Acid outwash sand is at a depth of 50 to more than 70 inches in this soil, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are small areas where slope is 3 or 4 percent and a few small areas where part of the subsoil formed in sand. Also included, in places where water ponds, are areas of somewhat poorly drained Stronghurst soils.

This soil is well suited to all crops commonly grown in the county. Lime is needed for good growth of legumes. If fertility is maintained, this soil can be farmed intensively. Capability unit I–3; woodland group 1; wildlife group 1.

Fayette silt loam, benches, 2 to 6 percent slopes, eroded (FbB2).—This soil is on benches in valleys. Areas are irregular in shape and 60 to 135 acres in size. In cultivated areas the plow layer generally is dark gray, but it is darker in a few areas where slopes are concave. Slopes are commonly 125 to 200 feet long.

Acid outwash sand is at a depth of 50 to more than 70 inches in this soil, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are a few small areas of moderately well drained soils and somewhat poorly drained Stronghurst soils on benches. Also included are small areas of nearly level and sloping soils and areas where part of the subsoil formed in sand.

This soil is well suited to all crops commonly grown in the county. Lime is required for good growth of legumes. Runoff is medium. Under intensive management in which erosion is controlled, row crops can be grown most seasons. Capability unit IIe–1; woodland group 1; wildlife group 1.

Fayette silt loam, benches, 6 to 12 percent slopes (FbC).—This soil is in areas of 40 to 100 acres on benches in valleys. The original surface layer was dark grayish brown or dark brown, but in most areas dark yellowish-brown material that was formerly in the subsoil has been mixed with it. A few narrow drainageways cross the areas. Slopes are 100 to 200 feet long.

Acid outwash sand is at a depth of 50 to more than 70 inches, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are small areas of gently sloping and moderately steep soils. Also included are areas of Tell soils that make up less than 10 percent of the total acreage.

This soil is productive if it is well managed. It is suited to all crops commonly grown in the county. Lime is required for good growth of legumes. Runoff is moderately rapid, and erosion is a severe hazard. Practices that minimize the hazard of erosion are helpful. Capability unit IIIe–1; woodland group 1; wildlife group 1.

Fayette silt loam, loamy substratum, 2 to 6 percent slopes, eroded (FcB2).—This soil is on glaciated benches and uplands. Areas are on hillsides, and they are 75 to

135 acres in size and irregular in shape. In cultivated areas the plow layer generally is dark gray, but in a few areas where slopes are concave it is darker. Slopes are commonly 175 to 225 feet long. Loam, silt loam, or silty clay loam glacial till is at a depth of 50 to more than 70 inches.

Except for the loamy substratum, the profile of this soil is similar to that described as representative of the series.

Included with this soil in mapping are a few small areas where the soil is moderately well drained and small areas of nearly level and sloping soils. Also included are small areas of Cadiz and Dodge soils.

This soil is well suited to all crops commonly grown in the county. Lime is required for good growth of legumes. The hazard of further erosion is moderate. Under intensive management that includes erosion control, row crops can be grown most years. Capability unit IIe-1; woodland group 1; wildlife group 1.

Fayette silt loam, loamy substratum, 6 to 12 percent slopes, eroded (FcC2).—This soil is in areas of 60 to 100 acres on almost uniformly smooth hillsides on glaciated uplands and benches. In cultivated areas the plow layer is dark grayish brown or dark brown. In a few small drainageways the surface layer is dark yellowish brown. Slopes are mostly 100 to 300 feet long. Loam, silt loam, or silty clay loam glacial till is at a depth of 50 to more than 70 inches.

This soil has a loamy substratum and a slightly thinner surface layer, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are small areas where slope is less than 6 percent or more than 12 percent. Also included, and making up less than 10 percent of the total acreage, are areas of Cadiz and Dodge soils.

This soil is well suited to all crops commonly grown in the county. Lime is needed for good growth of legumes. Runoff is moderately rapid, and the hazard of further erosion is severe. Careful management is needed to control erosion. Capability unit IIIe-1; woodland group 1; wildlife group 1.

Fayette silt loam, loamy substratum, 12 to 20 percent slopes, eroded (FcD2).—This soil is in areas of 40 to 80 acres on the lower parts of slopes. It receives runoff from higher slopes. The original surface layer was dark grayish brown, but in most areas dark-brown or dark yellowish-brown material that was formerly in the subsoil has been mixed with it. A few narrow drainageways cross the areas. Slopes are mainly 75 to 150 feet long. Silt loam or silty clay loam glacial till is at a depth of 50 to 70 inches.

Except for the loamy substratum, the profile of this soil is similar to that described as representative of the series. The subsoil is about 30 inches thick. Water has washed away 2 to 8 inches of the original surface layer. The present plow layer is less friable, lower in content of organic matter, lower in fertility, and more difficult to keep in good tilth than the plow layer of the soil that is representative of the series.

Included with this soil in mapping are small areas of sloping and steep soils. Also included are small areas of Cadiz soils, Stronghurst soils that have a loamy substratum, and soils along drainageways.

Much of this soil is in meadow, pasture, or trees. If the level of management is high, the soil is well suited to all crops commonly grown in the county. Runoff is rapid, and the hazard of further erosion is severe. This soil has good potential for many species of trees and is especially suited to walnut and oak. Slopes that face south and southwest are more poorly suited to trees than slopes that face other directions. Capability unit IVe-1; woodland group 1; wildlife group 1.

Fayette silt loam, valleys, 6 to 12 percent slopes, eroded (FeC2).—This soil is in areas of 30 to 95 acres below steeper soils. It receives runoff from the higher soils. Slopes are concave, and they are 100 to 300 feet long. The surface layer generally is dark grayish brown, but in places it is slightly darker. The silt ranges in thickness from 4 to 10 feet. A few narrow drainageways cross the areas.

The surface layer is slightly thicker, and the subsoil contains slightly less clay, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are small areas of gently sloping and moderately steep soils. Also included are areas of Chaseburg soils that make up less than 10 percent of the total acreage.

This soil is suited to all crops commonly grown in the county. Lime is needed for good growth of legumes. Runoff is moderately rapid, and the hazard of further erosion is severe. Practices that control erosion and keep it to a minimum are helpful. Capability unit IIIe-1; woodland group 1; wildlife group 1.

Fayette silt loam, valleys, 12 to 20 percent slopes, eroded (FeD2).—This soil is below steeper soils in areas of 20 to 80 acres. It receives runoff from the higher soils. The surface layer is dark grayish brown. The silt is 4 to 10 feet thick. Slopes are mostly 75 to 150 feet long, and they are smooth and concave. A few narrow drainageways cross the areas.

The surface layer of this soil is slightly thicker, and the subsoil is slightly less clayey, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are small areas where slopes are less than 12 percent or more than 20 percent. Also included are small areas of Chaseburg soils in downslope drainageways.

Much of this soil is in meadow, pasture, or trees. Crops common to the county grow well in this soil if the level of management is high. The hazard of further erosion is severe. Runoff is rapid, and gullying is a concern of management. This soil has good potential for many species of trees. It is especially well suited to walnut and oak trees. Slopes that face south and southwest have much less potential for trees than those that face other directions. Capability unit IVe-1; woodland group 1, wildlife group 1.

Flagg Series

The Flagg series consists of deep, well-drained soils on glaciated uplands. Ground water is at a depth of more than 5 feet throughout the year. These soils formed under mixed hardwoods, partly in moderately deep silty loess and partly in loamy glacial till. Calcareous till is at a depth of more than 60 inches.

In a representative profile the surface layer is 8 inches of dark grayish-brown silt loam, and the subsurface layer is about 4 inches of brown silt loam that is slightly acid. The subsoil, about 52 inches thick, is brown silt loam in the upper 8 inches, dark yellowish-brown silty clay loam in the next 5 inches, brown and yellowish-brown silty clay loam in the next 17 inches, and yellowish-red clay loam in the lower 22 inches.

Available water capacity and natural fertility are high in Flagg soils. Permeability is moderate.

Flagg soils are suited to all crops commonly grown in the county. They also are suited to pasture, trees, and wildlife habitat. The main crops are corn, oats, and alfalfa.

If these soils are cultivated, contour stripcropping, diversions, terraces, and grassed waterways are needed to help to control erosion. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure are other helpful practices.

Representative profile of Flagg silt loam, 2 to 6 percent slopes, eroded, in a cultivated field (SE¼NE¼ sec. 25, T. 1 N., R. 9 E.):

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine, subangular blocky structure; friable; mildly alkaline; abrupt, wavy boundary.

A2—8 to 12 inches, brown (10YR 5/3) silt loam; moderate, thin, platy structure; friable; slightly acid; abrupt, wavy boundary.

B1—12 to 20 inches, brown (10YR 4/3) silt loam; moderate, fine, subangular blocky structure; friable; thick, continuous, bleached silt coats on ped faces; slightly acid; clear, wavy boundary.

B21t—20 to 25 inches, dark yellowish-brown (10YR 4/4) silty clay loam; moderate, fine, subangular blocky structure; firm; thin, discontinuous, dark-brown (10YR 3/3) clay films; strongly acid; clear, wavy boundary.

B22t—25 to 36 inches, brown (10YR 4/3) silty clay loam; moderate, medium, subangular blocky structure; firm; thin, discontinuous, dark yellowish-brown (10YR 4/4) clay films; strongly acid; clear, wavy boundary.

B23t—36 to 42 inches, yellowish-brown (10YR 5/4) light silty clay loam; weak, medium, subangular blocky structure; firm; thin patchy clay films on all ped faces; strongly acid; abrupt, wavy boundary.

IIB24t—42 to 64 inches, yellowish-red (5YR 5/6) clay loam; weak, medium, subangular blocky structure; very firm; thin, discontinuous, dark reddish-brown (5YR 3/4) clay films; strongly acid; clear, wavy boundary.

The loess ranges from 30 to 50 inches in thickness. Depth to calcareous loam or sandy loam glacial till ranges from 60 to 100 inches. The surface layer in undisturbed areas is black or very dark brown in color and 2 to 4 inches in thickness. The upper part of the subsoil is silt loam and silty clay loam, and the lower part is strong-brown (7.5YR 4/4) to yellowish-red (5YR 5/6) clay loam or sandy clay loam. In places dolomite bedrock is at a depth of 55 to 65 inches.

Flagg soils are above Pecatonica soils in the landscape and near Dodge soils. They have a thicker mantle of silt than Pecatonica soils, and they are deeper to calcareous till than Dodge soils. Flagg soils are similar in texture to Ogle soils, but their surface layer is lighter colored than that of Ogle soils.

Flagg silt loam, 0 to 2 percent slopes (FlA).—This soil is on convex crests of ridges in irregularly shaped areas of 70 to 240 acres. In cultivated areas the plow layer is almost uniformly dark grayish brown, but in a few areas where slopes are concave, color is darker.

This soil is slightly deeper, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are small areas where slopes are 3 to 4 percent. Also included are a few small areas of somewhat poorly drained Stronghurst soils that have a loamy substratum.

This soil is well suited to all crops commonly grown in the county. Applications of lime are needed for good growth of legumes. If fertility is maintained, this soil can be farmed intensively. Capability unit I–3; woodland group 1; wildlife group 1.

Flagg silt loam, 2 to 6 percent slopes, eroded (FlB2).—This soil has the profile described as representative of the series. It is on hillsides and ridgetops in irregularly shaped areas of 75 to 235 acres. In cultivated areas the plow layer is almost uniformly dark grayish brown, but in a few areas where slopes are concave, the color is darker. Slopes generally are 150 to 225 feet long.

Included with this soil in mapping are a few small areas of somewhat poorly drained Stronghurst soils that have a loamy substratum and a few small areas of well-drained Pecatonica soils. Also included are small areas of nearly level and sloping soils and, west of Monroe and in a few other locations, areas of soils that have an 18- to 30-inch loamy overburden.

This soil is well suited to all crops commonly grown in the county. The moderate hazard of further erosion is the only restriction to use. Under intensive management that includes erosion control, row crops can be grown most years. Capability unit IIe–1; woodland group 1; wildlife group 1.

Flagg silt loam, 6 to 12 percent slopes, eroded (FlC2).—This soil is in areas of 68 to 125 acres. The surface layer is dark grayish brown, but in most areas part of the dark yellowish-brown subsoil has been mixed with it. A few small drainageways cross the areas. Slopes are smooth, and they are 100 to 200 feet long.

This soil has a thinner and lighter colored surface layer, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are small areas of gently sloping and moderately steep soils. Also included, and making up less than 10 percent of the total acreage, are areas of Pecatonica soils.

This soil is productive if it is well managed. It is suited to all crops commonly grown in the county. Runoff is moderately rapid, and the hazard of further erosion is severe. Practices that minimize the erosion hazard are useful. Capability unit IIIe–1; woodland group 1; wildlife group 1.

Fox Series

The Fox series consists of moderately deep, well-drained soils on benches in valleys. Most areas are in the valley of the Sugar River. Ground water is at a depth of more than 5 feet.

These soils formed under mixed hardwoods in moderately deep outwash. They are underlain by deep, sandy and gravelly, calcareous outwash.

In a representative profile the surface layer is 7 inches of dark grayish-brown loam, and the subsurface layer is about 3 inches of grayish-brown loam. The subsoil, about 23 inches thick, is reddish-brown loam and yellowish-red sandy clay loam in the upper part and yellowish-red clay loam and sandy clay loam in the lower part. It is underlain by light yellowish-brown and light-gray sand and gravel that is single grained and calcareous.

Available water capacity and natural fertility are moderate in Fox soils. Permeability is moderate in the subsoil, but it is rapid in the underlying sand and gravel. The calcareous sand and gravel limit the thickness of the root zone.

Most Fox soils are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. These soils also are suited to pasture, trees, and wildlife habitat. Most areas are easy to irrigate.

If these soils are cultivated, contour stripcropping, diversions, terraces, and grassed waterways are helpful in areas where there is a hazard of erosion. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure are other helpful practices.

Representative profile of Fox loam, 2 to 6 percent slopes, eroded, in a plowed field (NW¼SE¼SE¼ sec. 21, T. 4 N., R. 9 E.):

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) loam; moderate, fine, granular structure; friable; neutral; clear, wavy boundary.

A2—7 to 10 inches, grayish-brown (10YR 5/2) loam; weak, thin, platy structure; friable; slightly acid; gradual, wavy boundary.

B1—10 to 12 inches, reddish-brown (5YR 4/4) heavy loam; moderate, fine to medium, subangular blocky structure; friable; slightly acid; gradual, wavy boundary.

B21t—12 to 18 inches, yellowish-red (5YR 5/6) sandy clay loam; moderate, fine, subangular blocky structure; firm; thin, discontinuous, reddish-brown (5YR 4/4) clay films; slightly acid; gradual, wavy boundary.

B22t—18 to 29 inches, yellowish-red (5YR 5/6) clay loam; moderate, fine, subangular blocky structure; very firm; thin, discontinuous, dark reddish-brown (5YR 3/4) clay films; strongly acid; clear, wavy boundary.

I&IIB23t—29 to 33 inches, yellowish-red (5YR 4/8) sandy clay loam; weak, fine, subangular blocky structure; firm; thin, discontinuous, dark reddish-brown (5YR 3/4) clay films; neutral; clear, wavy boundary.

IIC—33 to 60 inches, light yellowish-brown (10YR 6/4) and light-gray (10YR 7/2) sand and gravel; structureless (single grained); loose; moderately alkaline; effervescent.

The Ap or A1 horizon is loam, silt loam, or sandy loam. These horizons are black (10YR 2/2) in undisturbed areas and brown (10YR 4/3) or dark grayish brown (10YR 4/2) in cultivated areas. The subsoil ranges from loam to clay loam and sandy clay loam in texture. Sand and gravel outwash is at a depth of 20 to 40 inches.

Fox soils are next to Ockley and Oshtemo soils and above Matherton soils. They have a thinner solum than Ockley soils and a slightly thinner and finer textured solum than Oshtemo soils. Fox soils are similar to but better drained than Matherton soils.

Fox loam, 0 to 2 percent slopes (FoA).—This soil is on benches in areas that are 80 to 200 acres in size and irregular in shape. In cultivated areas the plow layer generally is dark grayish brown, but in a few areas where slopes are concave it is darker.

The plow layer of this soil is slightly thicker, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are small areas of Ockley soils and areas where the surface layer is sandy loam. Also included, in shallow depressions, are small pockets of Matherton soils.

This soil is suited to all crops commonly grown in the county. Available water capacity is only moderate because of the moderate depth to limy sand and gravel. Keeping tillage to a minimum helps to conserve moisture. Other practices that help to conserve moisture, improve tilth, and increase the content of organic matter are useful. Capability unit IIs–1; woodland group 1; wildlife group 1.

Fox loam, 2 to 6 percent slopes, eroded (FoB2).—This soil has the profile described as representative of the series. It is on benches. The areas are 30 to 120 acres in size and irregular in shape. Slopes are convex, and they are 150 to 250 feet long. The plow layer is dark grayish brown, and it is 7 to 9 inches thick. Material that was formerly in the subsoil has been plowed into this layer.

Included with this soil in mapping are areas of Ockley soils that have limy sand and gravel at a depth of 40 to 60 inches. Also included are areas of uneroded soils in which the plow layer is slightly thicker and slightly lighter in color than that of the soil described as representative of the series.

This soil is suited to all crops commonly grown in the county. Available water capacity is only moderate because of the moderate depth to limy sand and gravel and the low content of organic matter. Useful practices are those that help to conserve moisture, control erosion, increase the content of organic matter, increase fertility, and improve tilth. Capability unit IIe–2; woodland group 1; wildlife group 1.

Fox loam, 6 to 12 percent slopes, eroded (FoC2).—This soil is on outwash plains and sides of benches in valleys. Areas are 15 to 60 acres in size. Slopes are convex and are 150 to 200 feet long.

The surface layer ranges from dark brown to brown in color and from 6 to 8 inches in thickness. The subsoil ranges from 18 to 22 inches in thickness. Depth to limy sand and gravel is 20 to 30 inches. This soil is poorer in tilth and lower in content of organic matter than the soil described as representative of the series, because material from the subsoil has been plowed into the surface layer.

Included with this soil in mapping are small areas where the soil is severely eroded. The soil in these areas is very poor in tilth, low in content of organic matter, and more difficult to cultivate than this Fox loam. Also included are areas where the surface layer is silt loam and sandy loam and areas of soils that have slopes of 12 to 20 percent. These more sloping soils have a very severe hazard of erosion.

If this soil is managed properly, it is suited to row crops, small grains, and hay. Restrictions to use and management concerns are the severe hazard of further erosion, the limited available water capacity, and the slightly limited root zone. Capability unit IIIe–2; woodland group 1; wildlife group 1.

Fox sandy loam, 6 to 12 percent slopes, eroded (FnC2).—This soil is on outwash plains and benches in valleys. Areas are irregular in shape and 15 to 60 acres in size. Slopes are convex, and they are 75 to 150 feet long. The content of organic matter and the level of natural fertility are lower in this soil than in that described as representative of the series.

The surface layer of this soil is sandy loam, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are areas where the soil is severely eroded. In these areas the soil has a very low content of organic matter, and it will not hold

so much moisture as soil in other areas. Also included are areas of soils that are uneroded.

If this soil is managed properly, it is suited to row crops, small grains, and hay. Use of the soil is restricted by the low available water capacity and the severe hazard of further erosion. Helpful practices are those that minimize these limitations. Capability unit IIIe–7; woodland group 3; wildlife group 1.

Fox sandy loam, 12 to 20 percent slopes, eroded (FnD2).—This soil is on outwash plains and benches in long areas of 15 to 60 acres on lower parts of hillsides. The plow layer is dark brown, and it is 6 to 8 inches thick. Material that formerly was in the subsoil has been plowed into this layer, and as a result the soil is poorer in tilth and lower in content of organic matter than similar uneroded soil. Depth to sand and gravel ranges from 20 to 28 inches.

Included with this soil in mapping are small areas of soils that are severely eroded. The soils in these areas are poor in tilth, very low in content of organic matter, and more difficult to cultivate than this Fox sandy loam. Also included are areas of uneroded soil that is similar to the soil described as representative of the series except the surface layer is sandy loam. Small areas of very shallow Rodman soils also are included. The Rodman soils have very low available water capacity.

This soil is most suitable for hay, pasture, trees, and wildlife habitat. The available water capacity is low, and the hazard of further erosion is very severe. Practices that help to minimize these hazards are useful. Capability unit IVe–7; woodland group 3; wildlife group 1.

Fox silt loam, 0 to 2 percent slopes (FsA).—This soil is on benches in irregularly shaped areas of 50 to 120 acres. The silt mantle is 8 to 20 inches thick.

The surface layer of the soil is silt loam, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are small areas of soils that have a silt mantle 20 to 30 inches thick. The upper part of the subsoil in those soils formed in silty material. Also included are small areas of Ockley soils, which are deeper to limy sand and gravel than this Fox soil.

This soil is suited to row crops, small grains, and hay. It is easy to irrigate. The moderate depth to limy sand and gravel limits the available water capacity, which is moderate. Practices that conserve moisture, improve tilth, increase fertility, and maintain the content of organic matter are helpful. Capability unit IIs–1; woodland group 1; wildlife group 1.

Fox silt loam, 2 to 6 percent slopes, eroded (FsB2).—This soil is on outwash plains and benches in long areas of 40 to 100 acres. Slopes are convex, and they are 150 to 250 feet long. The silt mantle is 8 to 15 inches thick. The surface layer is 5 to 7 inches thick.

This soil has a surface layer of dark-brown silt loam, but the profile otherwise is similar to that described as representative of the series. This soil is lower in fertility, lower in content of organic matter, and poorer in tilth than similar uneroded soils.

Included with this soil in mapping are small areas where the surface layer is loam and a few small areas of Ockley soils. Also included are areas of uneroded soils.

This soil is suited to all crops commonly grown in the county. Moderate depth to limy sand and gravel and moderately low content of organic matter limit the available water capacity, which is moderate. The hazard of further erosion is moderate. Practices that conserve moisture, improve tilth, increase content of organic matter, and control erosion are helpful. Capability unit IIe–2; woodland group 1; wildlife group 1.

Gale Series

The Gale series consists of well-drained soils on uplands. These soils are moderately deep over sand. Ground water is at a depth of more than 5 feet throughout the year. The soils are gently sloping to steep. Gale soils formed under stands of mixed hardwoods in loess over material weathered from sandstone bedrock. In most areas a thin layer of loose sand is above the sandstone bedrock.

In a representative profile the surface layer is about 7 inches of dark grayish-brown silt loam, and the subsurface layer is about 2 inches of brown silt loam. The subsoil, about 25 inches thick, is brown silt loam and silty clay loam in the upper part and brown loam in the lower part. It is underlain by yellowish-brown sand over yellowish-brown sandstone.

Natural fertility and available water capacity are medium in Gale soils. Permeability is moderate. Lack of moisture late in summer restricts growth of plants somewhat, especially if loose sand is at a depth of 24 to 26 inches.

Most Gale soils are suited to crops. The main crops are corn, oats, and alfalfa. These soils also are suited to pasture, woodland, and wildlife habitat.

If these soils are cultivated, contour stripcropping, diversions, terraces, and grassed waterways help to control erosion. Keeping tillage to a minimum, returning crop residue to the soil, applying barnyard manure, and pasture renovation also are helpful.

Representative profile of Gale silt loam, 6 to 12 percent slopes, eroded, in a cultivated field (SW¼NE¼ sec. 21, T. 3 N., R. 7 E.):

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine, granular structure; friable; mildly alkaline; clear, wavy boundary.

A2—7 to 9 inches, brown (10YR 5/3) silt loam; moderate, thin, platy structure; friable; neutral; abrupt, wavy boundary.

B1—9 to 15 inches, brown (10YR 4/3) heavy silt loam; moderate, very fine, subangular blocky structure; friable; slightly acid; clear, smooth boundary.

B21t—15 to 29 inches, brown (10YR 4/3) heavy silty clay loam; moderate, medium, subangular blocky structure; firm; thin, discontinuous, dark yellowish-brown (10YR 4/4) clay films; strongly acid; clear, smooth boundary.

IIB22t—29 to 34 inches, brown (10YR 4/3) loam; moderate, medium, subangular blocky structure; firm; thin, discontinuous, dark yellowish-brown (10YR 4/4) clay films; strongly acid; clear, smooth boundary.

IIC—34 to 44 inches, yellowish-brown (10YR 5/4) sand; single grained; loose; strongly acid; clear, smooth boundary.

IIR—44 to 60 inches, yellowish-brown (10YR 5/4) weakly cemented sandstone bedrock.

The silt mantle ranges from 20 to 30 inches in thickness. The plow layer ranges from 6 to 9 inches in thickness, and it is dark grayish brown (10YR 4/2) or dark brown (10YR

4/3) in color. In undisturbed areas the surface layer is 2 to 4 inches of black silt loam. In many places in cultivated areas, the subsurface layer has been mixed with the surface layer. Loam and sandy loam residuum from sandstone are below the silt. The loose sand or loamy sand in the substratum is yellowish brown (10YR 5/4) or light brownish yellow (10YR 6/4). Thickness of the solum ranges from 24 to 40 inches. Sandstone bedrock is at a depth of 36 to 48 inches.

Gale soils are above Northfield soils in the landscape, but they are deeper to sandstone bedrock and have a finer textured subsoil than Northfield soils. Gale and Sylvester soils both are underlain by sandstone, but Gale soils have a thinner and lighter colored surface layer than Sylvester soils.

Gale silt loam, 2 to 6 percent slopes, eroded (GaB2).—This soil is on broad ridgetops and the upper parts of slopes in areas of 75 to 165 acres. Slopes are smooth and convex, and they are 150 to 200 feet long.

This soil is slightly deeper to bedrock, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are small areas of Fayette soils. The Fayette soils have higher available water capacity and higher natural fertility than this Gale soil. Also included are small areas where slopes are 6 to 8 percent. The hazard of erosion is severe in these areas.

If this soil is well managed, it is suited to all crops commonly grown in the county. The hazard of further erosion is moderate. Available water capacity is moderate because of the moderate depth of this soil. Practices that control erosion, increase the rate of infiltration, and conserve moisture are helpful. Other helpful practices are those that maintain or improve tilth, increase fertility, and increase the content of organic matter. Capability unit IIe–2; woodland group 1; wildlife group 1.

Gale silt loam, 6 to 12 percent slopes, eroded (GaC2).—This soil has the profile described as representative of the series. The surface layer is very dark grayish brown in undisturbed areas. This Gale soil is on the middle parts of slopes in narrow areas of 40 to 95 acres. Slopes are smooth and convex, and they are 100 to 175 feet long. A few narrow drainageways cut the areas.

Included with this soil in mapping are areas of Northfield soils that have sandstone bedrock at a depth of 10 to 20 inches.

If this soil is well managed, it is suited to all crops commonly grown in the county. The slopes and the moderate available water capacity limit use. Erosion needs to be controlled and moisture needs to be conserved because of the severe hazard of further erosion and the moderate depth to bedrock. Capability unit IIIe–2; woodland group 1; wildlife group 1.

Gale silt loam, 12 to 20 percent slopes, eroded (GaD2).—This soil is on the lower parts of slopes in narrow areas of 40 to 65 acres. The surface layer is dark grayish brown. In places topsoil has accumulated at the bases of hills. Small drainageways commonly cross the areas. Slopes are 50 to 100 feet long.

Depth to sand in this soil is 20 to 26 inches, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are small areas of Northfield soils and areas where the plow layer is severely eroded. In these areas the content of organic matter is low, and the soil is poor in tilth. Also included, at the bases of slopes and in drainageways, are small areas of Lindstrom and Huntsville soils.

This soil is better suited to small grains, forage crops, pasture, and wildlife habitat than to other uses. The moderately steep slopes, the very severe hazard of further erosion, and the limited depth to bedrock are serious management concerns. If this soil is cultivated, practices that control erosion and conserve moisture are helpful. Other useful practices are those that maintain tilth and content of organic matter and improve fertility. Capability unit IVe–2; woodland group 1; wildlife group 1.

Gale silt loam, 20 to 30 percent slopes, eroded (GaE2).—This soil is on the lower parts of hillsides in narrow areas of 10 to 45 acres. The surface layer is dark grayish brown or brown. In places topsoil has accumulated at the bases of hills. Small drainageways commonly cross the areas. Slopes are 50 to 100 feet long.

Sand is at a depth of 20 to 26 inches in this soil, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are small areas of Northfield soils and areas where the plow layer is severely eroded. Soil in these areas is low in content of organic matter and poor in tilth. Also included are small areas of Lindstrom and Huntsville soils at the bases of slopes and in drainageways.

This soil is better suited to forage crops, pasture, and wildlife habitat than to other uses. The steep slopes, very severe hazard of further erosion, and limited thickness over bedrock are serious management concerns. Pasture renovation, tree planting, and improvement of wildlife habitat are helpful practices. Capability unit VIe–2; woodland group 1; wildlife group 1.

Gotham Series

The Gotham series consists of deep, excessively drained soils on benches in valleys. Ground water in these soils is at a depth of more than 5 feet throughout the year. Gotham soils formed under thin stands of mixed hardwoods that had an understory of prairie grasses.

In a representative profile the surface layer is about 9 inches of very dark grayish-brown loamy sand. The subsoil is about 20 inches of brown loamy sand. It is underlain by light yellowish-brown sand that is single grained, loose, and medium acid in reaction.

Available water capacity and natural fertility are low in these soils, and the use of these soils for farming is limited. Permeability is rapid. Water held in the root zone is lost rather quickly by evaporation and transpiration of plants. Soil blowing occurs in cultivated areas.

Most areas of these soils are used for corn, small grains, hay, and pasture. The crops respond to fertilizer if the moisture supply is adequate.

Practices that conserve moisture, control soil blowing and water erosion, and raise the level of fertility are needed. Wind stripcropping and the planting of pine trees help in the control of soil blowing and erosion, and windbreaks of pine trees help to conserve moisture by spreading and holding snow. Other helpful practices are keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure.

Representative profile of Gotham loamy sand, 2 to 6 percent slopes, eroded, in a cultivated field (in the east-central part of NW¼NE¼ sec. 17, T. 3 N., R. 8 E.) :

Ap—0 to 9 inches, very dark grayish-brown (10YR 3/2) loamy sand; weak, medium, granular structure; very friable; neutral; clear, wavy boundary.

B1—9 to 15 inches, brown (10YR 4/3) light loamy sand; weak, medium, subangular blocky structure; very friable; slightly acid; gradual, wavy boundary.

B2t—15 to 29 inches, brown (10YR 4/3) loamy sand; weak, medium, subangular blocky structure; very friable; clay bridging; medium acid; gradual, wavy boundary.

C—29 to 60 inches, light yellowish-brown (10YR 6/4) sand; single grained; loose; medium acid.

The solum ranges from 24 to 36 inches in thickness. The Ap horizon is very dark brown (10YR 2/2) or very dark grayish brown (10YR 3/2), and it ranges from 6 to 10 inches in thickness. In places a small part of the B2t horizon is sandy loam. In some areas the underlying sand has bands of loamy sand to light sandy loam less than 1 inch thick.

Gotham soils are near Billett and Plainfield soils. Their subsoil is coarser textured than that of Billett soils. Gotham soils have a weakly developed subsoil, but the subsoil in Plainfield soils lacks development. Gotham and Dickinson soils both are underlain by sand, but Gotham soils are coarser textured and have a lighter colored surface layer than Dickinson soils. Gotham and Oshtemo soils are both moderately coarse textured, but Gotham soils formed over acid sands, and Oshtemo soils formed over calcareous sand and gravel.

Gotham loamy sand, 0 to 2 percent slopes (GoA).—This soil is on undulating benches in irregularly shaped areas of 20 to 90 acres. This soil is more nearly level than the one described as representative for the series, but the profiles are similar. In cultivated areas the plow layer is very dark brown or very dark grayish brown. This layer is darker colored in a few areas where slopes are concave.

Included with this soil in mapping are areas where the surface layer is 10 to 15 inches in thickness and very dark grayish brown to black in color. Also included are small areas where the soil has a sandy loam or loam subsoil.

If this soil is managed properly, it is suited to row crops, small grains, and hay. Use is limited by the low available water capacity, low natural fertility, and severe hazard of soil blowing. Major management concerns are conserving moisture, improving fertility, increasing the content of organic matter, and controlling erosion. Capability unit IVs–3; woodland group 4; wildlife group 3.

Gotham loamy sand, 2 to 6 percent slopes, eroded (GoB2).—This soil has the profile described as representative of the series. It is on convex benches in irregularly shaped areas of 20 to 80 acres.

Included in places with this soil in mapping are areas where the surface layer is 10 to 15 inches in thickness and very dark brown to black in color. Also included are small areas of Billett soils that have a sandy loam or loam subsoil and areas of soil that is uneroded but otherwise is similar to this Gotham soil. The uneroded soil has a surface layer that is very dark grayish brown or very dark brown.

If this soil is well managed, it is suited to row crops, small grains, and hay. Use is limited by the low available water capacity, low natural fertility, severe hazard of soil blowing, and moderate hazard of further erosion. Major management concerns are conserving moisture, improving fertility, increasing the content of organic matter, and controlling erosion. Capability unit IVs–3; woodland group 4; wildlife group 3.

Gotham loamy sand, 6 to 12 percent slopes, eroded (GoC2).—This soil is on convex benches in long areas of 20 to 50 acres. The surface layer is dark brown.

This soil is slightly shallower to sand, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are small areas of Plainfield soils and areas of uneroded soils similar to this Gotham soil except that the surface layer is very dark grayish brown.

This Gotham soil is suited to small grains, hay, pasture, timber, and wildlife habitat. Use is limited by the low available water capacity, low natural fertility, severe hazard of further erosion, and severe hazard of soil blowing. Major management concerns are conserving moisture, improving fertility, increasing the constant of organic matter, and controlling erosion. Capability unit IVs–3; woodland group 4; wildlife group 3.

Griswold Series

The Griswold series consists of deep, well-drained soils on ground moraines in glaciated uplands. Ground water is at a depth of more than 5 feet throughout the year. These soils formed under prairie grasses in thin loess and sandy loam glacial till.

In a representative profile the surface layer is about 9 inches of black silt loam, and the subsurface layer is about 6 inches of dark-brown silt loam. The subsoil, about 23 inches thick, is dark yellowish-brown loam in the upper and lower parts and brown sandy clay loam in between. The underlying calcareous sandy loam till is yellowish brown.

Natural fertility is moderate, and available water capacity is moderate in Griswold soils. Permeability is moderate. The content of organic matter is high.

Griswold soils are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. These soils also are suited to pasture and wildlife habitat. If they are cultivated, contour stripcropping, diversions, terraces, and grassed waterways are needed to help control erosion. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure are other helpful practices.

Representative profile of Griswold silt loam, 2 to 6 percent slopes, eroded, in a cultivated field (SW¼SW¼ sec. 3, T. 4 N., R. 9 E.) :

Ap—0 to 9 inches, black (10YR 2/1) silt loam; moderate, very fine, granular structure; friable; neutral; clear, smooth boundary.

A3—9 to 15 inches, dark-brown (10YR 3/3) silt loam; moderate, fine, subangular blocky structure; friable; slightly acid; clear, smooth boundary.

B1—15 to 19 inches, dark yellowish-brown (10YR 4/4) heavy loam; moderate, fine, subangular blocky structure; firm; slightly acid; gradual, smooth boundary.

B2t—19 to 29 inches, brown (7.5YR 4/4) sandy clay loam; moderate, medium, subangular blocky structure; firm; thin, discontinuous, dark-brown (7.5YR 3/2) clay films; slightly acid; clear, wavy boundary.

B3—29 to 38 inches, dark yellowish-brown (10YR 4/4) light loam; weak, medium, subangular blocky structure; friable; neutral; clear, wavy boundary.

C—38 to 60 inches, yellowish-brown (10YR 5/4) sandy loam till; massive; friable; moderately alkaline; effervescent.

The surface layer ranges in color from black (10YR 2/1) to dark brown (10YR 3/3). The subsoil is 10 to 30 inches thick. Depth to calcareous sandy loam glacial till is 20 to 40 inches.

Griswold soils are underlain by sandy loam till, but Miami and Saybrook soils are underlain by loam till. Griswold soils have a thicker and darker colored surface layer than Miami soils. They are slightly coarser textured than Miami soils and not so fine textured as Saybrook soils. The entire subsoil in Griswold soils formed in glacial till, but only part of the subsoil in Saybrook soils formed in this kind of material.

Griswold silt loam, 2 to 6 percent slopes, eroded (GrB2).—This soil has the profile described as representative of the series. It is on convex ridgetops in glaciated uplands. Areas are 40 to 100 acres in size. Slopes are 150 to 250 feet long.

Included with this soil in mapping are small areas of Saybrook soils that have a dark-brown or very dark grayish-brown surface layer.

This Griswold soil is well suited to row crops, small grains, and hay. Crops grow well under good management. Use of this soil is limited by the moderate hazard of further erosion. Major management concerns are maintaining the content of organic matter, maintaining fertility, and controlling erosion. High content of organic matter, good tilth, moderate permeability, and gentle slopes make this soil relatively easy to farm. Capability unit IIe-1; woodland group 12; wildlife group 4.

Griswold silt loam, 6 to 12 percent slopes, eroded (GrC2).—This soil is on hillsides in long, narrow areas of 30 to 80 acres. Slopes are convex, and they are 100 to 200 feet long. In most areas the surface layer is very dark brown. This soil is slightly shallower to sandy loam till, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are small areas of Saybrook soils and areas on thin knolls and knobs where the surface layer is loam.

If this soil is well managed, it is suited to all crops commonly grown in the county. Use is limited by the severe hazard of further erosion. The major management concerns are controlling erosion, maintaining the content of organic matter, maintaining tilth, and improving fertility. Capability unit IIIe-1; woodland group 12; wildlife group 4.

Hebron Series

The Hebron series consists of deep, well-drained soils on benches in old lake basins. In places ground water is at a depth of 3 to 5 feet during wet periods.

Hebron soils formed under stands of mixed hardwoods in loamy outwash and calcareous silty and clayey lake-laid sediment. These soils are covered by a very thin mantle of loess.

In a representative profile, the surface layer is dark gray and about 8 inches thick. The subsoil, about 28 inches thick, is brown loam and dark yellowish-brown sandy clay loam in the upper part and dark-brown clay loam and brown silty clay in the lower part. Mottles are in the lower part. The subsoil is underlain by yellowish-brown silty clay loam.

Available water capacity is high and natural fertility is moderate in Hebron soils. Permeability is moderately slow.

Hebron soils are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. These soils are also suited to pasture, trees, and wildlife habitat. Contour stripcropping, diversions, terraces, and grassed waterways help to control erosion in cultivated areas. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure are practices that are especially helpful.

Representative profile of Hebron silt loam, 0 to 2 percent slopes, in a cultivated field (SW¼NE¼SE¼ sec. 8, T. 1 N., R. 6 E.):

Ap—0 to 8 inches, dark-gray (10YR 4/1) silt loam; weak, fine, subangular blocky structure; friable; mildly alkaline; abrupt, wavy boundary.

B1—8 to 13 inches, brown (10YR 4/3) loam; bleached silt coats; weak, fine, subangular blocky structure; friable; slightly acid; clear, wavy boundary.

B21t—13 to 19 inches, dark yellowish-brown (10YR 4/4) sandy clay loam; weak, medium, subangular blocky structure; firm; thin, discontinuous, dark-brown (7.5YR 4/4) clay films; slightly acid; clear, wavy boundary.

B22t—19 to 25 inches, dark-brown (7.5YR 4/4) clay loam; moderate, medium, subangular blocky structure; firm; thin, discontinuous, dark-brown (7.5YR 3/2) clay films; slightly acid; clear, wavy boundary.

IIB23t—25 to 36 inches, brown (10YR 4/3) silty clay; few, fine, prominent, yellowish-brown (10YR 5/6) mottles; moderate, fine, subangular blocky structure; very firm; thin, continuous, dark-brown (10YR 3/3) clay films; neutral; clear, wavy boundary.

IIC—36 to 60 inches, yellowish-brown (10YR 5/4) silty clay loam; weak, medium, platy structure; firm; moderately alkaline; effervescent.

The mantle of silt ranges from 8 to 18 inches in thickness. The Ap horizon is dark gray (10YR 4/1), dark grayish brown (10YR 4/2), or dark brown (10YR 4/3). In many places all of the A2 horizon is mixed with the Ap horizon. The loamy overburden ranges from 10 to 26 inches in thickness. The lower part of the subsoil, which formed in lacustrine material, ranges from heavy silty clay loam to silty clay in texture and from 6 to 12 inches in thickness. Depth to the calcareous lacustrine material generally is 24 to 40 inches.

Hebron soils are above areas of the Hebron, mottled subsoil variants. They are next to Saylesville soils in areas where the outwash overburden is less than 10 inches thick. Hebron soils are better drained than Hebron, mottled subsoil variants. They have a thick loamy overburden, which is not present in the Saylesville soils.

Hebron silt loam, 0 to 2 percent slopes (HbA).—This soil has the profile described as representative of the series. It is on benches in irregularly shaped areas of 35 to 95 acres. The plow layer is dark gray in cultivated areas, but it is darker where slopes are concave.

Included with this soil in mapping are small areas of Hebron, mottled subsoil variants, and areas where the soil is similar to this Hebron soil except the surface layer is loam. Also included are a few small areas where the loamy overburden is 36 to 60 inches thick.

Crops grow well in this soil if it is well managed. Use of the soil is limited by moderately slow permeability and moderate depth to underlying material. Drainage is helpful in areas where water ponds on the surface. Keeping tillage to a minimum and using proper tillage practices help to increase the rate of permeability by

improving tilth and increasing the content of organic matter. Capability unit IIs-7; woodland group 1; wildlife group 2.

Hebron silt loam, 2 to 6 percent slopes, eroded (HbB2).—This soil is on benches in long, narrow areas of 35 to 160 acres. Slopes are convex and complex, and they are 150 to 350 feet long. The surface layer generally is dark gray, but in places in depressions the color is darker. The plow layer is dark grayish brown or brown.

Included with this soil in mapping are a few small areas where the surface layer is loam. Also included are a few small areas that have a loamy overburden 36 to 60 inches thick and areas of uneroded soil that has a profile similar to the one described as representative of the series.

This soil is suited to all crops commonly grown in the county. Management concerns are the moderate hazard of erosion and moderate depth to underlying material. Capability unit IIe-6; woodland group 1; wildlife group 2.

Hebron Series, Mottled Subsoil Variant

These variants from the normal Hebron series are deep, somewhat poorly drained soils on low benches in old lake basins. Ground water is at a depth of 1 to 3 feet in wet periods. Most areas are in the Sugar River valley north of Brodhead and east of Albany. These soils formed under mixed hardwoods in loamy outwash at a medium depth and over calcareous silty and clayey lacustrine sediment.

In a representative profile the surface layer is about 7 inches of dark grayish-brown silt loam. The subsurface layer is about 2 inches of brown, mildly alkaline silt loam. The subsoil, about 24 inches thick, is brown silty clay loam and dark yellowish-brown sandy clay loam in the upper part and brown silty clay in the lower part. It is mottled throughout. The underlying material is mottled light-gray and yellowish-brown silty clay loam.

Available water capacity is high in these soils, and natural fertility is moderate. Permeability is moderately slow. Reaction is slightly acid or medium acid in areas where fertilizer has not been applied.

If these soils are drained sufficiently, they are suited to all crops commonly grown in the county. Crops are poorer in undrained areas than in drained areas, especially alfalfa crops.

In spring the high water table delays tillage operations and lowers soil temperature. Occasionally the soils are flooded for short periods. The major needs are practices that reduce wetness, control flooding, control erosion, maintain or improve tilth and fertility, and raise soil temperature. Needed practices are keeping tillage operations to a minimum and to the most suitable times, returning crop residue to the soil, and using other measures that improve or maintain tilth and fertility.

Representative profile of Hebron silt loam, mottled subsoil variant, 0 to 3 percent slopes, in a cultivated field (SW¼SE¼ sec. 15, T. 3 N., R. 9 E.):

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine, subangular blocky structure; friable; mildly alkaline; abrupt, wavy boundary.

A2—7 to 9 inches, brown (10YR 5/3) silt loam; few, fine, faint, dark-brown (7.5YR 4/4) mottles; moderate, thin, platy structure; friable; mildly alkaline; abrupt, wavy boundary.

B21t—9 to 15 inches, brown (10YR 4/3) silty clay loam; common, fine, faint, dark-brown (7.5YR 4/4) and grayish-brown (10YR 5/2) mottles; moderate, fine, subangular blocky structure; firm; thin, discontinuous. dark-brown (10YR 4/3) clay films; slightly acid; clear, wavy boundary.

IIB22t—15 to 26 inches, dark yellowish-brown (10YR 4/4) sandy clay loam; common, medium, distinct, yellowish-red (5YR 4/6) and light brownish-gray (10YR 6/2) mottles; moderate, medium, subangular blocky structure; firm; thin, discontinuous, dark yellowish-brown (10YR 3/4) clay films; slightly acid; abrupt, wavy boundary.

IIIB23t—26 to 33 inches, brown (7.5YR 4/2) silty clay; common, medium, distinct, yellowish-red (5YR 4/4) and light-gray (10YR 7/2) mottles; strong, medium, angular blocky structure; very firm; neutral; clear, wavy boundary.

IIIC—33 to 60 inches, light-gray (10YR 7/2) (40 percent) and yellowish-brown (10YR 5/4) (60 percent) silty clay loam; common, medium, prominent, yellowish-brown (10YR 5/8) mottles; weak, thin, platy structure; firm; moderately alkaline; effervescent.

The mantle of loess ranges from 8 to 18 inches in thickness. The Ap horizon ranges in color from dark gray (10YR 4/1) to brown (10YR 4/3). In places in cultivated areas all of the A2 horizon has been mixed with the Ap horizon. The loamy outwash overburden, in which most of the upper part of the subsoil formed, ranges from 8 to 24 inches in thickness. The lower part of the subsoil is 4 to 10 inches of silty clay or heavy silty clay loam. Depth to calcareous lacustrine sediment ranges from 22 to 40 inches.

These variants of the normal Hebron soils are below areas of Hebron soils and above areas of Navan soils. They have an overburden of outwash, which is lacking in Del Rey soils. Hebron, mottled subsoil variant, soils are more poorly drained than Hebron soils and better drained than Navan soils. They have a thinner and lighter colored surface layer than that of Navan soils.

Hebron silt loam, mottled subsoil variant, 0 to 3 percent slopes (HeA).—This soil is on low benches in long, narrow areas of 25 to 90 acres. The plow layer is almost uniformly dark grayish brown in cultivated areas. In a few areas where slopes are concave, the color is darker.

Included with this soil in mapping are small areas of Navan soils. Also included in places are areas of soil similar to this soil except that the surface layer is loam.

If this soil is well managed, it is well suited to all crops commonly grown in the county. Wetness caused by the high water table and periodic flooding is a concern of management. The wetness can be controlled by the use of open ditches and tile drains. Once the soil is drained, practices that increase fertility, improve tilth and permeability, and control erosion are helpful. Capability unit IIw-2; woodland group 7; wildlife group 5a.

Hixton Series

The Hixton series consists of moderately deep, well-drained soils on uplands. They are underlain by sandstone. Ground water is at a depth of more than 5 feet throughout the year. These soils formed under mixed hardwoods in material weathered from sandstone bedrock.

In a representative profile the surface layer is about 4 inches of very dark gray loam, and the subsurface layer is 4 inches of grayish-brown loam. The subsoil, about 25 inches thick, is brown and dark yellowish-brown loam in the upper part and strong-brown sandy loam in the lower

part. It is underlain by 6 inches of yellowish-red sand. The sand, in turn, is underlain by sandstone bedrock.

Natural fertility and available water capacity are moderate in Hixton soils. Permeability is moderate in the upper part of these soils and rapid in the lower part. Lack of moisture late in summer restricts crop growth, especially on steeper slopes. The content of organic matter is low.

Good management is needed for acceptable growth of crops. Because of the limited water capacity, practices are needed that help to conserve much of the rain that falls. Contour stripcropping and diversions help to control erosion. Keeping tillage to a minimum and returning crop residue to the soil help to conserve moisture and to improve or maintain tilth and the content of organic matter.

An undisturbed profile within an area of Hixton loam, 2 to 6 percent slopes, eroded (SW¼NE¼ sec. 18, T. 3 N., R. 7 E.):

A1—0 to 4 inches, very dark gray (10YR 3/1) light loam; moderate, medium, granular structure; friable; strongly acid; clear, smooth boundary.

A2—4 to 8 inches, grayish-brown (10YR 5/2) light loam; moderate, thin, platy structure; friable; strongly acid; clear, smooth boundary.

B1—8 to 15 inches, brown (10YR 4/3) loam; weak, medium, subangular blocky structure; friable; strongly acid; gradual, smooth boundary.

B2t—15 to 25 inches, dark yellowish-brown (10YR 4/4) heavy loam; moderate, medium, subangular blocky structure; firm; thin, discontinuous, dark-brown (7.5YR 4/4) clay films; strongly acid; gradual, smooth boundary.

B3—25 to 33 inches, strong-brown (7.5YR 5/6) sandy loam; weak, medium, subangular blocky structure; friable; very strongly acid; gradual, smooth boundary.

C—33 to 39 inches, yellowish-red (5YR 5/8) sand; structureless; loose; strongly acid; gradual, smooth boundary.

IIR—39 to 60 inches, sandstone bedrock.

The Ap horizon ranges from 6 to 9 inches in thickness and from dark gray (10YR 4/1) to brown (10YR 4/3) in color. All of the A2 horizon is mixed with the Ap horizon in many places. The subsoil ranges from dark yellowish brown (10YR 4/4) to strong brown (7.5YR 5/6) in color and from loam to light clay loam in texture. Depth to sandstone bedrock is 20 to 40 inches. Color of the bedrock ranges from yellowish brown (10YR 5/4) to yellowish red (5YR 5/8).

Hixton, Eleva, Northfield, and Sylvester soils all are underlain by sandstone at a depth of less than 40 inches. Areas of Hixton soils are above areas of Northfield soils. Hixton soils are finer textured than Eleva soils, and they are deeper to sandstone bedrock than Northfield soils. The Hixton soils are coarser textured than Sylvester soils, and they have a lighter colored and thinner surface layer.

Hixton loam, 2 to 6 percent slopes, eroded (HmB2).—This soil has the profile described for the series. Areas are on broad ridgetops and the upper parts of hillsides. They are 25 to 65 acres in size. Slopes are smooth and convex and are 150 to 200 feet long. In cultivated areas the plow layer is 6 to 8 inches in thickness and dark grayish brown in color.

Included with this soil in mapping are small areas of Eleva and Gale soils. Also included in places are small areas where slope is 6 to 8 percent.

If this soil is well managed, it is suited to all crops commonly grown in the county. Control of erosion is needed because of slopes and the limited rate of infiltration. Because of the limited water capacity, practices are needed that help to conserve much of the rain that falls. Also, practices that maintain or improve tilth and fertility and increase the content of organic matter are helpful. Capability unit IIe-2; woodland group 1; wildlife group 1.

Hixton loam, 6 to 12 percent slopes, eroded (HmC2).—This soil is on the middle parts of hillsides in long, narrow areas of 20 to 45 acres. Slopes are smooth and convex, and they are 100 to 175 feet long. A few narrow drainageways cross the areas. In cultivated areas the plow layer is 6 to 8 inches in thickness and brown in color.

This soil is slightly thinner over bedrock, but the profile otherwise is similar to that described for the series.

Included with this soil in mapping are areas of Eleva soils and small areas of Northfield soils.

If this Hixton soil is well managed, it is suited to all crops commonly grown in the county. Use of the soil is limited by slope and moderate available water capacity. The limited available water capacity, severe hazard of further erosion, and moderate depth to bedrock make it important to conserve moisture and control erosion. Capability unit IIIe-2; woodland group 1; wildlife group 1.

Houghton Series

The Houghton series consists of deep and poorly drained mucky peat on bottoms in valleys and in depressional areas of low benches. Most areas, however, are in major valleys of the county. Ground water is at or near the surface most of the year. These soils formed under sedge and grass in deep deposits of sedge peat. Areas are frequently flooded for long periods. Reeds and cattails grow in ponded areas.

In a representative profile the surface layer is 9 inches of black mucky peat. It is underlain by very dark brown and black mucky peat that extends to a depth of 102 inches or more.

Natural fertility is low in these soils, and available water capacity is high. The hazard of wetness is severe. Permeability is moderately rapid. Reaction is neutral.

These soils are not well suited to most engineering uses. If they are managed properly, however, they are suited to row crops, forage crops, and onions and other specialized crops. Undrained areas are suited to wildlife habitat, pasture, and marsh hay. Management that includes artificial drainage and control of soil blowing is needed. If suitable outlets are present, open ditches or tile drains can be used. Wind stripcropping or shelterbelts help to prevent soil blowing. The soils tend to be low in plant nutrients, especially trace elements; and because of this a complete program of soil testing and fertilization is required.

Representative profile of Houghton mucky peat in a cultivated field (NW¼NW¼ sec. 25, T. 4 N., R. 7 E.):

Oa1—0 to 9 inches, black (10YR 2/1) mucky peat; weak, fine, granular structure; friable; neutral; clear, wavy boundary.

Oa2—9 to 22 inches, very dark brown (10YR 2/2) mucky peat; weak, coarse, platy structure; friable; neutral; clear, wavy boundary.

Oa3—22 to 32 inches, black (10YR 2/1) mucky peat; weak, fine, granular structure; friable; neutral; clear, wavy boundary.

Oa4—32 to 50 inches, very dark brown (10YR 2/2) mucky peat; weak, thin, platy structure; friable; neutral; clear, wavy boundary.

Oa5—50 to 102 inches, black (10YR 2/1) mucky peat; weak, thick, platy structure; friable; neutral; clear, wavy boundary.

Color in Houghton soils ranges from black (10YR 2/1) to very dark grayish brown (10YR 3/2). The Oa1 horizon ranges from 4 to 20 inches in thickness. In places 2 to 12 inches of light-colored silty alluvium is present on the surface. Reaction ranges from 6 to 8.2 pH in these soils.

Houghton soils frequently are near Palms soils, and narrow areas of Adrian soils frequently are along the perimeter of areas of Houghton soils. Houghton soils are deeper to underlying mineral material than Adrian and Palms soils. They lack the loose sand at a depth of 20 to 40 inches of Adrian soils.

Houghton mucky peat (0 to 2 percent slopes) (Hu).—This is the only Houghton soil mapped in the county. It is on low benches and bottoms in irregularly shaped areas of 30 to 80 acres.

Included with this soil in mapping are small areas of Palms and Adrian soils. The underlying mineral material is at a depth of 51 inches or less in these areas.

If this soil is managed properly, it is suited to all crops commonly grown in the county. Use of this Houghton soil is limited by the high water table, severe hazard of flooding, moderate hazard of soil blowing, and low fertility. Major management concerns are draining off excess water, controlling floodwater, improving natural fertility, and controlling soil blowing. Capability unit IIIw-9; woodland group 10; wildlife group 6.

Huntsville Series

In the Huntsville series are deep, well-drained soils on bottoms adjacent to streams. In places ground water is at a depth of 3 to 5 feet in wet periods. These soils are in many of the larger valleys and drainageways in the unglaciated part of the county. They formed under prairie grasses in deep silty alluvium. In a representative profile the soil is black or very dark gray silt loam to a depth of 60 inches.

Natural fertility and available water capacity are high in Huntsville soils. Permeability is moderate. The content of organic matter is high, and reaction is neutral in undisturbed areas.

Flooding is frequent but of short duration. Fresh silt is added by the floodwater, and the soils drain quickly when streams subside. Damage to most crops by flooding is negligible except in areas where water remains in small depressions.

Crops grow well where these soils are properly managed. The soils are well suited to corn, small grains, grasses, and legumes. Areas inaccessible because of meandering streams are suited to permanent pasture or wildlife habitat. Keeping tillage to minimum helps maintain the content of organic matter and improve tilth. Streambank erosion can be reduced somewhat by the use of selected plants. Flooding can be controlled by straightening the stream channel and using diversions and dikes. Gently sloping soils can be helped by diverting runoff and by constructing grassed waterways.

Representative profile of Huntsville silt loam, 0 to 2 percent slopes, at an undisturbed site (SE¼SE¼ sec. 19, T. 1 N., R. 8 E.):

A11—0 to 11 inches, black (10YR 2/1) silt loam; moderate, fine, granular structure; friable; neutral; clear, wavy boundary.

A12—11 to 26 inches, very dark gray (10YR 3/1) silt loam; weak, fine, subangular blocky structure; friable; neutral; clear, wavy boundary.

A13—26 to 34 inches, black (10YR 2/1) silt loam; moderate, fine, granular structure; friable; neutral; clear, wavy boundary.

A14—34 to 60 inches, black (10YR 2/1) heavy silt loam; moderate, fine, subangular blocky structure; firm; neutral; clear, wavy boundary.

In a few areas gray silt loam or light silty clay loam is at a depth between 30 and 42 inches. The low-chroma color is caused by the color of the mineral grains in the soil material.

Huntsville soils are near Arenzville, Lindstrom, and Otter soils. They are darker colored than Arenzville soils and better drained than Otter soils. Huntsville soils lack a subsoil, but the subsoil in Lindstrom soils is well developed.

Huntsville silt loam, 0 to 2 percent slopes (HvA).—This soil has the profile described as representative of the series. It is on natural levees beside streams in long, narrow areas of 80 to 180 acres.

Included with this soil in mapping are small areas of Otter silt loam in depressions where water collects. The Otter soil dries slowly, causing delayed cultivation in these areas.

This Huntsville soil is suited to row crops, small grains, and hay. Flooding limits its use. Management concerns are controlling floodwater, maintaining the content of organic matter in the soil, and controlling streambank erosion. Capability unit IIw-11; woodland group 12; wildlife group 7.

Huntsville silt loam, 2 to 6 percent slopes (HvB).—This soil is in drainageways and small draws in long, narrow areas of 20 to 40 acres. The surface layer is slightly thinner, but the profile otherwise is similar to that described as representative of the series. Included in mapping are small areas of Lindstrom soils.

This soil is suited to row crops, small grains, and hay. It is subject to periodic flooding, but the flooding is less frequent and of shorter duration on this soil than on Huntsville silt loam, 0 to 2 percent slopes. Erosion is a moderate hazard. The formation of gullies is difficult to control, but grassed waterways or mechanical structures are helpful. Other management concerns are controlling flooding, improving tilth, and increasing the content of organic matter. Keeping tillage to a minimum helps to increase the content of organic matter and improve tilth. Capability unit IIw-11; woodland group 12; wildlife group 7.

Juda Series

The Juda series consists of deep, well-drained soils on glaciated uplands and on high benches in valleys. In places ground water is at a depth of 3 to 5 feet in wet periods. These soils formed under mixed hardwoods in moderately deep loess and silty clay loam glacial till.

In a representative profile the surface layer is about 7 inches of very dark grayish-brown silt loam, and the subsurface layer is about 2 inches of brown silt loam. The subsoil, about 27 inches thick, is dark-brown silt loam in the upper 4 inches and dark-brown and dark yellowish-brown silty clay loam below. It is underlain by yellowish-brown, calcareous silty clay loam till.

Natural fertility and available water capacity are high in Juda soils. Permeability is moderately slow.

These soils are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. The soils also are suited to pasture, trees, and wildlife habitat. Contour stripcropping, diversions, terraces, and grassed waterways help to control erosion in cultivated areas. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure are helpful practices.

Representative profile of Juda silt loam, 2 to 6 percent slopes, eroded, in a cultivated field (NW¼SE¼ sec. 21, T. 1 N., R. 6 E.):

Ap—0 to 7 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, fine, granular structure; friable; neutral; abrupt, wavy boundary.

A2—7 to 9 inches, brown (10YR 5/3) silt loam; continuous, bleached silt coats; weak, thin, platy structure; friable; slightly acid; clear, wavy boundary.

B1—9 to 13 inches, dark-brown (10YR 4/3) heavy silt loam; moderate, fine, subangular blocky structure; friable; bleached silt coatings on most faces of peds; slightly acid; clear, wavy boundary.

B21t—13 to 22 inches, dark-brown (10YR 4/3) silty clay loam; moderate, medium, subangular blocky structure; firm, nonplastic; few, thin, dark-brown (10YR 3/3) clay films on most faces of peds; medium acid; clear, wavy boundary.

IIB22t—22 to 33 inches, dark-brown (10YR 4/3) silty clay loam; moderate, medium, angular and subangular blocky structure; firm, slightly plastic; numerous, thin, dark-brown (10YR 3/3) clay films on most faces of peds, nearly continuous dark-brown (10YR 3/3) clay films on faces of peds nearer the lower boundary; 5 to 10 percent fine pebbles, by volume; medium acid; clear wavy boundary.

IIB23t—33 to 36 inches, dark yellowish-brown (10YR 4/4) silty clay loam; few, fine, faint, yellowish-brown (10YR 5/4) mottles; moderate, medium, angular and subangular blocky structure; firm, slightly plastic; dark-brown (10YR 3/3) thin clay films on faces of peds; 10 to 15 percent fine pebbles, by volume; slightly acid; clear, wavy boundary.

IIC—36 to 60 inches +, yellowish-brown (10YR 5/4) light slity clay loam; few, fine, distinct, yellowish-brown (10YR 5/6) mottles; weak, fine, angular blocky structure; firm, slightly plastic; moderately alkaline; strongly effervescent.

The silt mantle ranges from 20 to 36 inches in thickness. The Ap horizon is very dark brown, dark brown, or very dark grayish brown. In places the A2 horizon has been mixed with the Ap horizon by plowing. The B2t horizon ranges from 10 to 34 inches in thickness, and in places it is mottled in the lower part.

Juda soils, Fayette soils that have a loamy substratum, and Pecatonica and Saybrook soils all are silty soils that are underlain by glacial till. Juda soils have a thinner silt mantle than the Fayette soils. They formed in loess over glacial till, but the Fayette soils formed entirely in silt. Juda soils have a finer textured subsoil and are better drained than Lamartine soils. The solum in Juda soils is not so deep as the solum in Pecatonica soils. Juda soils have a thinner surface layer than Saybrook soils.

Juda silt loam, 2 to 6 percent slopes, eroded (JuB2).—This soil has the profile described as representative of the series. The areas are on ridgetops and the upper parts of hillsides. They are long and narrow and 75 to 165 acres in size. In cultivated areas the plow layer is almost uniformly very dark grayish brown, but in a few areas it is very dark brown. Slopes are 150 to 250 feet long.

Included with this soil in mapping are small areas of Downs silt loam, heavy substratum, and areas where the silt mantle is 36 to 50 inches thick. Also included are areas of soil similar to this Juda soil except that it is not eroded. In these areas tilth is better than that of Juda silt loam, 2 to 6 percent slopes, eroded, and the content of organic matter is higher.

If this soil is well managed, it is well suited to all crops commonly grown in the county. Major limitations are the moderate hazard of further erosion and the moderately slow permeability of the subsoil. Major management concerns are increasing the content of organic matter, improving tilth and fertility, and controlling erosion. Capability unit IIe–1; woodland group 1; wildlife group 1.

Juda silt loam, 6 to 12 percent slopes, eroded (JuC2).—This soil is on uplands in long, narrow areas of 75 to 165 acres on the middle parts of hillsides. A few narrow drainageways cut the areas. In cultivated areas the plow layer is 6 to 8 inches in thickness and generally is very dark grayish brown in color. In a few areas, however, this layer is very dark brown or dark brown. Slopes are slightly convex and 100 to 150 feet long. This soil receives runoff from higher soils.

This Juda soil is slightly shallower to underlying till, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are small areas of Morley silt loam and areas where the soil is moderately well drained.

If this soil is well managed, it is suited to all crops commonly grown in the county. The severe hazard of further erosion and moderately slow permeability of the subsoil limit use. The major management concerns are controlling erosion, increasing the content of organic matter, and improving tilth and fertility. Capability unit IIIe–1; woodland group 1; wildlife group 1.

Lamartine Series

The Lamartine series consists of deep somewhat poorly drained soils on low benches in glaciated valleys. Ground water is at a depth of 1 to 3 feet in wet periods. Areas of these soils are small and scattered. The soils formed under mixed hardwoods in moderately deep loess and loam glacial till.

In a representative profile the surface layer is 8 inches of very dark gray silt loam, and the subsurface layer is about 3 inches of brown silt loam. The subsoil, about 27 inches thick, is mottled, dark-brown, dark yellowish-brown, and light olive-brown silty clay loam in the upper 17 inches and light brownish-gray clay loam in the lower 10 inches. The underlying loam till is grayish brown.

Natural fertility and available water capacity are high in these soils. Permeability is moderate. Reaction is medium acid or slightly acid in undisturbed areas.

If Lamartine soils are sufficiently drained, they are suited to all crops commonly grown in the county. The main crops are corn, oats, and clover. These soils also are suited to meadow, pasture, woodland, and wildlife habitat. Drainage is needed, and open ditches or tile drains are suitable. Areas adjacent to streams are subject to periodic flooding, which generally occurs in spring and is of short duration. Diversions that intercept runoff from higher areas and grassed waterways that channel water help to control erosion and reduce wetness. Keeping tillage to a minimum, returning crop residue to

the soil, and applying barnyard manure are other helpful practices.

Representative profile of Lamartine silt loam, 1 to 6 percent slopes, in a cultivated field (NW¼SE¼ sec. 22, T. 2 N., R. 8 E.):

Ap—0 to 8 inches, very dark gray (10YR 3/1) silt loam; weak, fine, granular structure; friable; neutral; clear, wavy boundary.

A2—8 to 11 inches, brown (10YR 5/3) silt loam; few, fine, distinct, dark-brown (7.5YR 4/4) mottles; weak, thin, platy structure; friable; slightly acid; abrupt, wavy boundary.

B1—11 to 19 inches, dark-brown (10YR 4/3) silty clay loam; common, fine, prominent, strong-brown (7.5YR 5/8) mottles; weak, fine, subangular blocky structure; firm; neutral; clear, wavy boundary.

B21t—19 to 26 inches, dark yellowish-brown (10YR 4/4) silty clay loam; many, medium, distinct, light brownish-gray (10YR 6/2) and strong-brown (7.5YR 5/6) mottles; moderate, fine, subangular blocky structure; firm; thin, discontinuous, dark-brown (7.5YR 4/4) clay films; slightly acid; clear, wavy boundary.

B22t—26 to 28 inches, light olive-brown (2.5Y 5/4) silty clay loam; many, medium, prominent, brownish-yellow (10YR 6/8) and strong-brown (7.5YR 5/8) mottles; moderate, fine, subangular blocky structure; firm; thin, discontinuous clay films; slightly acid; clear, wavy boundary.

IIB23t—28 to 38 inches, light brownish-gray (2.5Y 6/2) clay loam; common, medium, prominent, brownish-yellow (10YR 6/8) and strong-brown (7.5YR 5/8) mottles; weak, fine, subangular blocky structure; firm; thin, patchy clay films on horizontal and vertical ped faces; slightly acid; clear, wavy boundary.

IIC—38 to 60 inches, grayish-brown (2.5Y 5/2) loam; massive; firm; moderately alkaline; effervescent.

The silt mantle ranges from 20 to 36 inches in thickness. In the Ap horizon hue is 10YR, value is 2 or 3, and chroma is 1 or 2. Depth to calcareous loam glacial till ranges from 30 to 45 inches. Depth to and intensity of mottling vary slightly from place to place.

Lamartine soils are above areas of Brookston and Ossian soils, below areas of Dodge soils, and near areas of Stronghurst silt loam, loamy substratum. They are better drained than Brookston and Ossian soils and more poorly drained than Dodge soils. The Lamartine soils have a thinner mantle of silt than Stronghurst silt loam, loamy substratum.

Lamartine silt loam, 1 to 6 percent slopes (LaB).—This is the only Lamartine soil mapped in the county. It is on benches in long, narrow areas of 25 to 65 acres. In cultivated areas the plow layer is almost uniformly very dark gray in color, but in a few areas it is very dark brown. Slopes are 150 to 250 feet long.

Included with this soil in mapping are small areas of Muscatine silt loam, loamy substratum, and areas of soils in which depth to ground water is more than 3 feet in wet periods. Also included are areas of eroded soil that is similar to this Lamartine soils except it is poorer in tilth and lower in content of organic matter.

If this soil is well managed, it is well suited to all crops commonly grown in the county. The moderate hazard of erosion and moderate hazard of wetness limit use. Protection from runoff and removal of excess subsurface water are needed for maximum production of crops. Open ditches and tile drains are suitable. The major management concerns are controlling erosion, removing excess water, increasing the content of organic matter, and improving tilth and fertility. Capability unit IIw-2; woodland group 7; wildlife group 5a.

Lawler Series

The Lawler series consists of deep, somewhat poorly drained soils on low benches in valleys. Ground water is at a depth of 1 to 3 feet in wet seasons. These soils formed under prairie grasses in deep, acid, sandy outwash.

In a representative profile the surface layer is about 12 inches of very dark brown loam, and the subsurface layer is about 4 inches of very dark grayish-brown sandy loam. The subsoil, about 19 inches thick, is mottled brown loam in the upper 14 inches and mottled yellowish-brown sandy loam in the lower 5 inches. It is underlain by yellowish-brown sand.

Natural fertility and available water capacity are moderate in Lawler soils. Permeability is moderate. Content of organic matter is high.

If these soils are sufficiently drained, they are suited to all crops commonly grown in the county. Undrained areas are less productive than drained areas, and alfalfa does not grow well in the undrained areas. All areas of these soils are suited to trees, pasture, and wildlife habitat. In places thickness of the root zone is restricted by the water table, which fluctuates between depths of 1 and 3 feet. Flooding occurs in places during periods of prolonged rainfall, and water ponds in depressions. Diversions that intercept runoff from higher slopes and open ditches that provide sufficient drainage and have suitable outlets are helpful. The soils are unsuited to tile drains unless they are properly blinded. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure are other helpful practices.

Representative profile of Lawler loam, 0 to 2 percent slopes, in a cultivated field (SE¼SE¼ sec. 24, T. 2 N., R. 9 E.):

Ap—0 to 12 inches, very dark brown (10YR 2/2) light loam; moderate, medium, granular structure; friable; medium acid; abrupt, smooth boundary.

A3—12 to 16 inches, very dark grayish-brown (10YR 3/2) sandy loam; moderate, medium, subangular blocky structure; friable; medium acid; abrupt, smooth boundary.

B1—16 to 19 inches, brown (10YR 4/3) loam; many, medium, faint, dark-brown (7.5YR 4/4) and many, distinct, light brownish-gray (10YR 6/2) mottles; moderate, medium, subangular blocky structure; friable; medium acid; clear, smooth boundary.

B2—19 to 30 inches, brown (10YR 4/3) heavy loam; many, medium, prominent, strong-brown (7.5YR 5/6) and light-gray (10YR 7/2) mottles; moderate, medium, subangular blocky structure; firm; strongly acid; gradual, wavy boundary.

B3—30 to 35 inches, yellowish-brown (10YR 5/4) sandy loam; many, coarse, prominent, gray mottles (10YR 6/1); weak, medium, subangular blocky structure; very friable; strongly acid; gradual, smooth boundary.

C1—35 to 50 inches, yellowish-brown (10YR 5/8 and 10YR 5/6) medium sand; single grained; loose; slightly acid; gradual, smooth boundary.

C2—50 to 65 inches, yellowish-brown (10YR 5/4 and 10YR 5/6) medium sand; single grained; loose; neutral.

The surface layer ranges from 10 to 17 inches in thickness and is black (10YR 2/1), very dark grayish brown (10YR 3/2), or very dark brown (10YR 2/2) in color. In places areas of these soils have a silt mantle that is 10 to 20 inches thick. The subsoil ranges from light loam to light silty clay loam in texture and from strong brown (7.5YR 5/6) to brown (10YR 5/3) in color. Depth to sandy outwash ranges from 20 to 36 inches.

Lawler soils are below Dakota soils and above Marshan soils. They are more poorly drained than Dakota soils but better drained than Marshan soils. Lawler soils have a surface layer that is thicker and slightly darker colored than the surface layer of Shiffer soils.

Lawler loam, 0 to 2 percent slopes (LeA).—This soil has the profile described as representative of the series. The areas, which are on benches, are 25 to 65 acres in size and irregular in shape. In cultivated areas the plow layer is almost uniformly very dark brown. The color of this layer is slightly darker in concave areas where water ponds. Included in mapping are small areas of Marshan loam.

If this soil is sufficiently drained, it is suited to all crops commonly grown in the county. Wetness and moderate natural fertility limit use. Major management concerns are removing excess water, improving fertility, and maintaining the high content of organic matter. Capability unit IIw-5; woodland group 7; wildlife group 5a.

Lawler silt loam, 0 to 3 percent slopes (LlA).—This soil is on low benches in areas of 25 to 85 acres. In cultivated areas the plow layer is very dark brown or black. In places water ponds in depressions.

More silt is in the surface layer and upper part of the subsoil of this Lawler soil, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are small areas of Marshan silt loam in depressions where water collects. Also included are areas where the mantle of silt is 20 to 36 inches thick.

If this soil is sufficiently drained, it is suited to row crops, small grains, and hay. Wetness and moderate natural fertility limit use. Major management concerns are removing excess water, improving fertility, and maintaining the high content of organic matter. Capability unit IIw-5; woodland group 7; wildlife group 5a.

Lindstrom Series

The Lindstrom series consists of deep, well-drained soils on colluvial valley slopes. Ground water is at a depth of more than 5 feet throughout the year. These soils are below steeper sloping soils.

Lindstrom soils formed under prairie grass in deep silty loess that continually receives small amounts of soil material from higher areas. Silt loams have formed where silty material has been deposited, and sandy loams have formed where loamy material has been deposited.

In a representative profile the surface layer is about 26 inches of black and very dark grayish-brown silt loam. The subsoil, about 29 inches thick, is brown silt loam in the upper part and dark yellowish-brown silt loam in the lower part. It is underlain by brown silt loam.

Natural fertility and available water capacity are high in Lindstrom soils. Permeability is moderate. Reaction is medium acid to neutral in undisturbed areas.

Where slopes are favorable and erosion is controlled, Lindstrom soils are well suited to such crops as corn, oats, and alfalfa. Areas of these soils that are too steep for cultivation are well suited to meadow, pasture, and wildlife habitat. If Lindstrom soils are cultivated, controlling erosion and maintaining tilth and the content of organic matter are helpful practices. Contour stripcropping, diversions, terraces, and grassed waterways help to control erosion. Diversions that intercept runoff from higher slopes are especially helpful in this control. Grassed waterways help to keep gullies from forming. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure are other helpful practices.

An undisturbed profile within an area of Lindstrom silt loam, 6 to 12 percent slopes, eroded (SW¼SW¼ sec. 6, T. 4 N., R. 8 E.):

A1—0 to 14 inches, black (10YR 2/1) silt loam; moderate, medium, granular structure; very friable; slightly acid; clear, wavy boundary.

A3—14 to 26 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, medium, subangular structure; friable; medium acid; clear, wavy boundary.

B1—26 to 33 inches, brown (10YR 4/3) silt loam; moderate, fine, subangular blocky structure; firm; few, patchy, dark-brown (10YR 3/3) clay films on vertical ped faces; medium acid; gradual, wavy boundary.

B21—33 to 40 inches, brown (10YR 4/3) silt loam; moderate, fine, subangular blocky structure; firm; patchy, dark-brown (10YR 3/3) clay films on vertical ped faces; medium acid; gradual, wavy boundary.

B22—40 to 44 inches, dark yellowish-brown (10YR 4/4) silt loam; moderate, medium, subangular blocky structure; firm; few, patchy, dark yellowish-brown (10YR 3/4) clay films on vertical ped faces; slightly acid; clear, wavy boundary.

B3—44 to 55 inches, dark yellowish-brown (10YR 4/4) silt loam; weak, medium, subangular blocky structure; firm; slightly acid; clear, wavy boundary.

C—55 to 60 inches, brown (10YR 4/3) silt loam; massive; firm; slightly acid.

The A horizon generally is very dark brown (10YR 2/2) or black (10YR 2/1) in color, but the Ap horizon is very dark grayish brown (10YR 3/2) or dark brown (10YR 3/3) in cultivated areas and in areas of eroded soils. In places areas of these soils have an overburden of sandy loam 10 to 20 inches thick. In some areas the solum contains small amounts of chert, sand, or chert and sand. This material has moved down from soils at a higher elevation. In places a thin layer of light silty clay loam is in the B21 horizon.

Lindstrom soils are on concave valley slopes above areas of Tama silt loam, benches. They are near areas of Fayette silt loam, valleys, and near areas of Huntsville soils in drainageways. Lindstrom soils have a lower clay content, and they are not so well developed as Tama soils. Their surface layer is thicker and darker colored than that of Fayette silt loam, valleys, and thinner than that of Huntsville soils.

Lindstrom sandy loam, 6 to 12 percent slopes, eroded (LnC2).—This soil is on concave valley slopes in narrow areas of 30 to 60 acres. The areas receive runoff from steeper soils at higher elevation. Slopes commonly are 100 to 150 feet long.

This soil has a surface layer of sandy loam 10 to 20 inches thick, but the profile otherwise is similar to that described for the series.

Included with this soil in mapping are areas where the surface layer of sandy loam is 20 to 36 inches thick.

If this soil is managed properly, it is suited to all crops grown in the county. Use is limited by the hazard of further erosion caused by slope and the large amounts of water that run onto the soil from soils at higher elevation. Besides the problems created by sheet erosion, gullies form in drainageways. The major management concerns are controlling erosion, maintaining fertility, and maintaining the content of organic matter in the surface layer. Capability unit IVe-4; woodland group 3; wildlife group 4.

Lindstrom sandy loam, 12 to 20 percent slopes, eroded (LnD2).—This soil is in narrow, concave, colluvial areas of 25 to 50 acres. Slopes are 75 to 125 feet long.

The surface layer of this soil is 10 to 20 inches of sandy loam, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are areas where the surface layer of sandy loam is 20 to 36 inches thick. Also included are areas where slope is 20 to 30 percent.

If erosion is controlled and tilth and fertility are improved, this soil is suited to small grains and hay. Use is limited by the very severe hazard of further erosion caused by slope and runoff water from higher slopes. Major management concerns are controlling sheet and gully erosion and conserving moisture. Practices that maintain tilth, fertility, and the content of organic matter are helpful. Capability unit VIe-4; woodland group 3; wildlife group 4.

Lindstrom silt loam, 6 to 12 percent slopes (LsC).—This soil has the profile described as representative of the series. The areas are narrow and 30 to 80 acres in size. They are on concave valley slopes below areas of steeper sloping soils, and they receive runoff from the higher soils. Slopes are commonly 125 to 175 feet long.

Included with this soil in mapping are a few areas where the surface layer is thin and is sandy loam in texture.

If this soil is well managed, it is suited to row crops, small grains, and hay. Use is limited by the severe hazard of erosion caused by slope and by runoff water from higher slopes. Major management concerns are controlling erosion and increasing tilth and the content of organic matter. Capability unit IIIe-1; woodland group 12; wildlife group 4.

Lindstrom silt loam, 12 to 20 percent slopes, eroded (LsD2).—This soil is on concave hillsides in long, narrow areas of 30 to 70 acres. These areas are below areas of steeper sloping soils, and they receive runoff from the higher soils. A few narrow drainageways cross the areas. In cultivated areas the plow layer is very dark grayish brown or dark brown. Slopes are 75 to 125 feet long.

The surface layer of this soil is slightly thinner, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are a few small areas of Huntsville soils in drainageways and a few small areas where slope is 20 to 30 percent.

If this soil is managed properly, it is suited to all crops commonly grown in the county. It also is suited to pasture and wildlife habitat. The very severe hazard of further erosion and the runoff water from higher areas are the major limitations to use. Major management concerns are control of sheet erosion and gullies and maintenance of tilth, fertility, and the content of organic matter. Capability unit IVe-1; woodland group 12; wildlife group 4.

Marshan Series

The Marshan series consists of deep, poorly drained soils on low benches in valleys. Ground water is at or near the surface most of the year.

These soils formed under sedge grass mostly in deep sandy outwash, but in places the upper part of the soil formed in silt.

In a representative profile the surface layer is about 14 inches of black silt loam. Below this is about 4 inches of very dark gray silt loam. The subsoil, about 13 inches thick, is light brownish-gray loam in the upper part and grayish-brown loam in the lower part. It is underlain by loose sand that is neutral in reaction.

Natural fertility is high in Marshan soils, and available water capacity is moderate. Permeability is moderate.

If these soils are drained sufficiently, they are well suited to row crops, small grains, and hay. Undrained areas are better suited to wildlife habitat and pasture than to other uses. Runoff is very slow on these soils. Seepage and runoff from adjacent uplands keep the water table at or near the surface most of the year. Small depressions retain water long enough to interfere with tillage operations. These soils warm slowly in spring and cool quickly in fall. They are subject to frequent flooding. Major management needs are reducing wetness, controlling floodwater, maintaining or improving tilth and fertility, and raising soil temperature. Removal of excess water by drainage or interception of runoff water by diversions makes the soils better suited to crops. Important practices are return of crop residue to the soil, minimum and properly timed tillage, and other practices that maintain tilth and fertility.

Representative profile of Marshan silt loam (0 to 2 percent slopes) in a cultivated field (SE¼SE¼ sec. 13, T. 1 N., R. 9 E.):

Ap—0 to 9 inches, black (10YR 2/1) silt loam; weak, medium, granular structure; friable; moderately alkaline; clear, wavy boundary.

A12—9 to 14 inches, black (10YR 2/1) heavy silt loam; moderate, fine, subangular blocky structure; friable; neutral; clear, wavy boundary.

A3—14 to 18 inches, very dark gray (10YR 3/1) heavy silt loam; common, fine, prominent, light yellowish-brown (10YR 6/4) mottles; moderate, fine, subangular blocky structure; friable; neutral; clear, wavy boundary.

B21g—18 to 26 inches, light brownish-gray (2.5Y 6/2) loam; few, fine, prominent, yellowish-brown (10YR 5/6) mottles; weak, fine, subangular blocky structure; firm; neutral; clear, wavy boundary.

B22g—26 to 31 inches, grayish-brown (2.5Y 5/2) heavy loam; few, fine, prominent, yellowish-brown (10YR 5/6) mottles; weak, medium, subangular blocky structure; firm; neutral; abrupt, wavy boundary

Cg—31 to 60 inches, grayish-brown (10YR 5/2) fine sands; few, fine, prominent, yellowish-brown (10YR 5/6) mottles; single grained; loose; neutral.

The Ap horizon is black (10YR 2/1) or very dark gray (10YR 3/1) in color, and it ranges from 8 to 12 inches in thickness. The silt mantle, where present, has a maximum thickness of 20 inches. Where the silt mantle approaches maximum thickness, the upper part of the subsoil is silt loam or silty clay loam. Otherwise, the subsoil in Marshan loam is loam or sandy clay loam. The lower part ranges from sandy loam to light sandy loam to light sandy clay loam in texture and from 8 to 16 inches in thickness. Depth to sand outwash in Marshan soils ranges from 24 to 40 inches. Reaction of the outwash sand ranges from 6.1 to 7.8 pH.

Marshan and Ettrick soils are both poorly drained, and both formed in alluvium. Marshan soils have a thinner silt mantle than Ettrick soils, which formed mostly in silt. The Marshan soils are below areas of Lawler soils, and they are more poorly drained than the Lawler soils.

Marshan loam (0 to 2 percent slopes) (Mb).—This soil is on low benches in irregularly shaped areas of 30 to 160

acres. In cultivated areas the plow layer is almost uniformly black. In places water ponds in small areas. This soil has a surface layer of loam, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are small areas of somewhat poorly drained Lawler soils. Also included are areas of soils that have a thin mantle of silt.

If this soil is drained sufficiently, it is suited to all crops commonly grown in the county. Use is limited by wetness, which causes the soil to be slow to warm in spring and quick to cool in fall. Major management concerns are removing excess water, maintaining fertility, maintaining the high content of organic matter, and proper timing of tillage. Capability unit IIw-5; woodland group 7; wildlife group 5b.

Marshan silt loam (0 to 2 percent slopes) (Mc).—This soil has the profile described as representative of the series. Areas are on low benches. They are irregular in shape and 40 to 200 acres in size. In cultivated areas the plow layer is almost uniformly black. In places water ponds in small areas.

Included with this soil in mapping are areas of soils that have a silt mantle 20 to 36 inches thick. Most of these areas are south of Brodhead. Also included in places are small areas of Adrian and Ettrick soils.

If this soil is drained sufficiently, it is suitable for row crops, small grains, and hay. Wetness limits use and causes the soil to warm slowly in spring and cool quickly in fall. Major management concerns are removing excess water, maintaining the level of fertility, maintaining the high content of organic matter, and proper timing of tillage. Capability unit IIw-5; woodland group 7; wildlife group 5b.

Matherton Series

The Matherton series consists of deep, somewhat poorly drained soils on moderately low benches in outwash plains. Ground water is at a depth of 1 to 3 feet during wet periods.

These soils formed under thin stands of mixed hardwoods that had an understory of grass. The loamy outwash is moderately deep, and it is underlain by calcareous sand and gravel outwash.

In a representative profile the surface layer is about 7 inches of very dark grayish-brown silt loam, and the subsurface layer is about 4 inches of light brownish-gray, slightly acid silt loam. The subsoil, about 23 inches thick, is 4 inches of dark yellowish-brown loam in the upper part and mottled brown and light brownish-gray sandy clay loam in the lower part. It is underlain by brown and light-gray gravelly sand.

Natural fertility, available water capacity, and permeability are moderate in Matherton soils.

If these soils are sufficiently drained, they are suited to all crops commonly grown in the county. Undrained areas are not so well suited to crops as drained areas, however; and alfalfa, especially, grows more poorly in the undrained areas. All areas are suited to woodland, pasture, and wildlife habitat. The seasonal high water table restricts the thickness of the root zone. In places flooding occurs during long rainy periods, and water ponds in depressions. These soils are not suited to tile drains, but open ditches provide adequate drainage where suitable outlets are available. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure are helpful practices.

Representative profile of Matherton silt loam in a cultivated field (NE¼NW¼ sec. 6, T. 4 N., R. 9 E.):

Ap—0 to 7 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, medium, subangular blocky structure; friable; slightly acid; abrupt, smooth boundary.

A2—7 to 11 inches, light brownish-gray (10YR 6/2) silt loam; few, medium, prominent, strong-brown (7.5YR 5/6) mottles; weak, fine, platy structure; friable; slightly acid; clear, wavy boundary.

B1—11 to 15 inches, dark yellowish-brown (10YR 4/4) loam; many, medium, distinct, light brownish-gray (10YR 6/2) mottles; moderate, medium, subangular blocky structure; firm; medium acid; clear, wavy boundary.

B21t—15 to 22 inches, brown (10YR 5/3) sandy clay loam, 15 percent pebbles; common, medium, faint, light brownish-gray (10YR 6/2) and prominent yellowish-red (5YR 4/6) mottles; moderate, medium, subangular blocky structure; firm; thin, discontinuous, brown (7.5YR 4/2) clay films; medium acid; clear, wavy boundary.

B22t—22 to 34 inches, light brownish-gray (10YR 6/2) sandy clay loam; common, medium, distinct, dark-brown (7.5YR 4/4) and dark reddish-brown (5YR 3/4) mottles; moderate, medium, subangular blocky structure; firm; thin, discontinuous, brown (7.5YR 4/2) clay films; slightly acid; gradual, smooth boundary.

C—34 to 60 inches, brown (10YR 5/3) and light-gray (10YR 7/2) gravelly sand; single grained; loose; moderately alkaline; effervescent.

The surface layer is black (10YR 2/1), very dark grayish brown (10YR 3/2), or very dark brown (10YR 2/2). Depth to calcareous sand and gravel outwash ranges from 20 to 40 inches. Thickness of the sandy clay loam part of the subsoil, or finer textured part, is always more than 10 inches.

Matherton soils are near Fox and Thackery soils. They are more poorly drained than Fox soils and shallower to underlying outwash than Thackery soils. Matherton soils are similar in texture, drainage, and position to Shiffer soils; but the Matherton soils formed over calcareous outwash, and the Shiffer soils formed over acid outwash.

Matherton silt loam (0 to 2 percent slopes) (Md).—This is the only Matherton soil mapped in the county. It is on benches in areas of 30 to 90 acres. In places water ponds on the surface.

Included with this soil in mapping are small areas of well-drained Fox soils and small areas of poorly drained Sebewa soils. Also included are a few areas where the surface layer is loam.

If this soil is well managed, it is suited to all crops commonly grown in the county. Wetness and a restricted root zone, however, limit use. Artificial drainage and practices that maintain tilth and improve fertility are helpful. Capability unit IIw-5; woodland group 7; wildlife group 5a.

Maumee Series

The Maumee series consists of deep, poorly drained soils on low benches in valleys. Ground water is at or near the surface of these soils most of the year. The Maumee soils formed under sedge grasses in deep outwash sand.

In a representative profile the upper 16 inches is black sandy loam. This material is underlain by mottled, olive-gray and light brownish-gray sand.

Natural fertility is low in Maumee soils, and available water capacity is low in drained areas. Permeability is moderately rapid.

Beneficial practices are those that remove excess water and protect the soil from flooding. Cultivated areas of these soils are subject to soil blowing. Undrained areas are better suited to meadow, pasture, and wildlife habitat than to other uses.

Representative profile of Maumee sandy loam in a cultivated field (SE¼NE¼ sec. 36, T. 2 N., R. 9 E.):

Ap—0 to 6 inches, black (10YR 2/1) sandy loam; weak, fine, subangular blocky structure; friable; slightly acid; clear, wavy boundary.

A12—6 to 11 inches, black (N 2/0) sandy loam; weak, fine, subangular blocky structure; friable; slightly acid; clear, wavy boundary.

A13—11 to 16 inches, black (N 2/0) sandy loam; few, fine, distinct, dark yellowish-brown (10YR 4/4) mottles; weak, medium, subangular blocky structure; friable; slightly acid; clear, wavy boundary.

C1g—16 to 24 inches, olive-gray (5Y 5/2) medium sand; few, fine, distinct, dark yellowish-brown (10YR 4/4) mottles; single grained; loose; slightly acid; clear, wavy boundary.

C2g—24 to 60 inches, light brownish-gray (10YR 6/2) fine sand; few, fine, prominent, brownish-yellow (10YR 6/6) mottles; single grained; loose; slightly acid.

The Ap horizon is black (10YR 2/1) or dark gray (10YR 3/1). Depth to loose sand is 10 to 20 inches. Reaction in the C horizon ranges from 6.0 to 7.5 pH.

Maumee soils are next to Marshan soils. Maumee soils lack a subsoil, but Marshan soils have one.

Maumee sandy loam (0 to 2 percent slopes) (Me).—This is the only Maumee soil mapped in the county. It is on low benches in areas of 30 to 80 acres. In places water ponds on the surface.

Included with this soil in mapping are a few small areas where the surface layer is muck. Also included are small areas of Adrian and Marshan soils.

If this soil is sufficiently drained and is protected from flooding, it is suited to row crops, small grains, and hay. Major management concerns are providing adequate drainage that can be controlled, protecting from flooding, maintaining the content of organic matter, increasing fertility, and providing protection from soil blowing. Capability unit IVw-5; woodland group 8; wildlife group 5b.

Meridian Series

The Meridian series consists of deep, well-drained soils on benches in large valleys. Ground water is at a depth of more than 5 feet in these soils throughout the year. Meridian soils formed in deep, acid, sandy outwash under thin stands of mixed hardwoods that had an understory of prairie grass.

In a representative profile the surface layer is about 8 inches of very dark grayish-brown loam. The subsoil, about 23 inches thick, is dark yellowish-brown and brown loam in the upper 14 inches and yellowish-brown loamy sand in the lower 9 inches. It is underlain by yellowish-brown sand.

Natural fertility, available water capacity, and permeability are moderate in Meridian soils.

Meridian soils are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. These soils also are suited to pasture, woodland, and wildlife habitat. Contour stripcropping, diversions, terraces, and grassed waterways help to control water erosion in areas of cultivated soils. Pine-tree windbreaks and wind stripcropping help to control soil blowing. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure help to improve tilth and fertility and to maintain the content of organic matter.

Representative profile of Meridian loam, 2 to 6 percent slopes, eroded, in a cultivated field (NE¼NE¼ sec. 3, T. 3 N., R. 8 E.):

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) light loam; weak, fine, subangular blocky structure; friable; slightly acid; abrupt, wavy boundary.

B21t—8 to 17 inches, dark yellowish-brown (10YR 4/4) loam; weak, fine, subangular blocky structure; friable; thin, patchy, dark yellowish-brown (10YR 3/4) clay films on all ped faces; medium acid; clear, wavy boundary.

B22t—17 to 22 inches, brown (10YR 4/3) heavy loam; weak, medium, subangular blocky structure; firm; thin, discontinuous, dark-brown (10YR 3/3) clay films; strongly acid; clear, wavy boundary.

IIB3—22 to 31 inches, yellowish-brown (10YR 5/4) loamy sand; weak, coarse, subangular blocky structure; very friable; strongly acid; clear, wavy boundary.

IIC—31 to 97 inches, yellowish-brown (10YR 5/4) medium sand; single grained; loose; few, thin, strong-brown (7.5YR 5/6) bands of loamy sand at various intervals; strongly acid.

The Ap horizon ranges from black (10YR 2/1) to dark brown (10YR 3/3) and is 6 to 10 inches thick. In the B2 horizon texture ranges from loam to sandy clay loam. Depth to loose sand outwash ranges from 20 to 40 inches. Reaction of the underlying sandy outwash ranges from pH 5.1 to pH 6.5. Bands of loamy sand and sandy loam are between depths of 36 and 60 inches in many places. They are strong brown (7.5YR 5/6) to dark brown (7.5YR 4/4) in color and ½ to 1½ inches thick. The cumulative thickness of the bands is less than 6 inches.

Meridian soils are next to Billett, Gotham, and Tell soils; near Dakota soils; and above Shiffer soils. They have a finer textured solum than Billett and Gotham soils. Their surface layer is thinner than that of Dakota soils. Meridian soils are better drained than Shiffer soils, and they lack the silt mantle of Tell soils.

Meridian loam, 0 to 2 percent slopes (MlA).—This soil is on benches in irregularly shaped areas of 40 to 160 acres. The surface layer is almost uniformly very dark brown. The sursurface layer is brown and about 31 inches thick.

This soil is slightly deeper to sand, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are small areas of soils that are moderately eroded because of soil blowing. Also included are small areas of somewhat poorly drained Shiffer soils.

If this soil is properly managed, it is well suited to all crops commonly grown in the county. Also, if it is irrigated, it is well suited to such special crops as potatoes, beans, green peppers, and cucumbers. Use is limited by the moderate available water capacity and the slight hazard of soil blowing. Management concerns are conserving moisture, controlling soil blowing, maintaining the content of organic matter, maintaining tilth, and increasing fertility. Capability unit IIs-1; woodland group 1; wildlife group 1.

Meridian loam, 2 to 6 percent slopes, eroded (MlB2).—This soil has the profile described as representative of the series. In a few areas where slopes are concave, however, the surface layer is darker than that shown in the representative profile. The soil is on convex benches

in long areas of 30 to 100 acres. Slopes are 200 to 300 feet long.

Included with this soil in mapping are small areas of soils that are mottled in the lower part of the subsoil. Also included are small areas of Billett soils that are slightly coarser textured than this Meridian soil.

If this soil is managed properly, it is well suited to all crops commonly grown in the county. Areas that are irrigated are well suited to such special crops as potatoes, beans, and green peppers. The moderate available water capacity and moderate hazards of soil blowing and further water erosion limit use of this soil. Major management concerns are conserving moisture, controlling soil blowing and water erosion, and maintaining the content of organic matter. Capability unit IIe–2; woodland group 1; wildlife group 1.

Meridian loam, 6 to 12 percent slopes, eroded (MlC2).—This soil has convex slopes and is in long narrow areas of 20 to 60 acres. The surface layer is mostly very dark grayish brown or dark brown, but in places the dark yellowish-brown subsoil is visible.

Depth to loose sand is 20 to 26 inches in this Meridian soil, but the profile otherwise is similar to that described as representative of the series. Included in mapping are small areas of slightly coarser textured Billett soils.

If this soil is properly managed, it is fairly well suited to row crops, small grains, and hay. Major limitations to use are the moderate available water capacity, severe hazard of further water erosion, and moderate hazard of soil blowing. Major management concerns are conserving moisture, controlling soil blowing and water erosion, improving fertility, and maintaining the high content of organic matter. Capability unit IIIe–2; woodland group 1; wildlife group 1.

Miami Series

The Miami series consists of deep, well-drained soils on glaciated uplands and on high benches in valleys. Ground water is at a depth of more than 5 feet in these soils throughout the year. The Miami soils formed under mixed hardwoods in very thin loess over loamy glacial till.

In a representative profile the surface layer is 7 inches of dark grayish-brown silt loam, and the subsurface layer is about 2 inches of grayish-brown silt loam that is slightly acid in reaction. The subsoil, about 19 inches thick, is mainly dark yellowish-brown clay loam in the upper 15 inches and dark-brown loam in the lower 4 inches. It is underlain by till of brown calcareous loam.

Natural fertility is moderate in these soils, and available water capacity is high. Permeability is moderate. Reaction is medium acid or slightly acid in undisturbed areas.

Miami soils are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. These soils also are suited to pasture, woodland, and wildlife habitat. If they are cultivated, contour stripcropping, diversions, terraces, and grassed waterways are needed to help control erosion. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure are other helpful practices.

Representative profile of Miami silt loam, 6 to 12 percent slopes, eroded, in a cultivated field (NW¼NW¼ sec. 1, T. 1 N., R. 8 E.):

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine, granular structure; friable; many roots; neutral; abrupt, wavy boundary.

A2—7 to 9 inches, grayish-brown (10YR 5/2) silt loam; moderate, thin, platy structure; friable; slightly acid; abrupt, wavy boundary.

B1—9 to 11 inches, dark yellowish-brown (10YR 4/4) heavy silt loam; moderate, very fine, subangular blocky structure; friable; continuous, bleached silt coats; slightly acid; clear, wavy boundary.

IIB21t—11 to 15 inches, dark yellowish-brown (10YR 4/4) light clay loam; very fine, subangular blocky structure; firm; thin, discontinuous, dark-brown (7.5YR 4/4) clay films; slightly acid; clear, wavy boundary.

IIB22t—15 to 24 inches, dark yellowish-brown (10YR 4/4) clay loam; moderate, fine, subangular blocky structure; very firm; thin, continuous, dark-brown (7.5YR 4/4) clay films; medium acid; clear, wavy boundary.

IIB23t—24 to 28 inches, dark-brown (10YR 4/3) heavy loam; moderate, fine, subangular blocky structure; firm; thin, discontinuous, dark-brown (7.5YR 4/4) clay films; slightly acid; clear, wavy boundary.

IIC—28 to 60 inches, brown (10YR 5/3) loam; weak, thin, platy structure; friable; moderately alkaline; effervescent.

The Ap horizon ranges from dark grayish brown to brown in color. In places the A2 horizon has been mixed into the Ap horizon by plowing. The silt mantle ranges from 10 to 18 inches in thickness. The subsoil is 14 to 30 inches thick, and in places it is mottled in the lower part. The underlying calcareous till is heavy sandy loam to light silt loam.

Miami soils are next to and below areas of Dodge soils, near areas of Griswold soils, and above areas of Lamartine soils. They have a thinner silt mantle than Dodge soils, and their subsoil is finer textured than that of Griswold soils. Miami soils have a thinner silt mantle than Lamartine soils, and they are better drained than the Lamartine soils. Miami and Morley soils both are underlain by glacial till, but the glacial till in Miami soils is loam, and the glacial till in Morley soils is silty clay loam. Also, Miami soils have a subsoil of silt loam, clay loam, and loam; and Morley soils have a subsoil of silty clay and silty clay loam.

Miami silt loam, 2 to 6 percent slopes, eroded (MmB2).—This soil is on ridgetops and the upper parts of long, narrow, steep areas of 15 to 65 acres. In cultivated areas the plow layer is almost uniformly dark grayish brown, but in a few areas it is very dark grayish brown. Slopes are 150 to 250 feet long.

Included with this soil in mapping are small areas of Dodge silt loam and areas where the soils are moderately well drained. Also included are areas of soil similar to this Miami soil except that it is uneroded. In these areas tilth is better and the content of organic matter is higher than in Miami silt loam, 2 to 6 percent slopes, eroded.

If this soil is well managed, it is well suited to all crops commonly grown in the county. Use of this soil is limited only by the moderate hazard of further erosion. Major management concerns are increasing the content of organic matter, improving tilth and fertility, and controlling erosion. Capability unit IIe–1; woodland group 1; wildlife group 1.

Miami silt loam, 6 to 12 percent slopes, eroded (MmC2).—This soil has the profile described as representative of the series. Areas are long and narrow and almost uniform in shape. They are 10 to 125 acres in size. Slopes are slightly convex and 100 to 150 feet long. In cultivated areas the plow layer generally is dark grayish brown in

color and 6 to 8 inches in thickness. In a few areas, however, the color is brown. A few narrow drainageways commonly cross the areas.

Included with this soil in mapping are small areas of Dodge silt loam and areas where the surface layer is loam.

If this soil is well managed, it is suited to all crops commonly grown in the county. The only limitation to use is a severe hazard of further erosion. Major management concerns are controlling erosion, increasing the content of organic matter, and improving tilth and fertility. Capability unit IIIe-1; woodland group 1; wildlife group 1.

Miami silt loam, 12 to 20 percent slopes, eroded (MmD2).—This soil is on the lower parts of hillsides in areas of 2 to 20 acres. The surface layer is dark grayish brown, but in most areas dark yellowish-brown material that was formerly in the subsoil has been mixed with it. A few narrow drainageways cross the areas. Slopes are mainly 80 to 130 feet long.

The surface layer of this Miami soil is thinner, but the profile otherwise is similar to that described as representative of the series. Water erosion has eliminated 2 to 8 inches of the surface layer. The present plow layer is less friable, lower in content of organic matter and fertility, and more difficult to keep in good tilth than that of the soil described as representative of the series.

Included with this soil in mapping are small areas of sloping or steep soils and areas where the surface layer is loam.

Much of this Miami soil is in pasture or trees. If the soil is well managed, it is fairly well suited to all crops commonly grown in the county. Runoff is rapid, and the hazard of further erosion is very severe. Major management concerns are increasing the content of organic matter, maintaining tilth, improving fertility, and controlling erosion. Capability unit IVe-1; woodland group 1; wildlife group 1.

Mifflin Series

The Mifflin series consists of moderately deep, well-drained soils that are underlain by fractured dolomite bedrock at a depth of 2 to 3½ feet. Ground water is at a depth of more than 5 feet throughout the year. Mifflin soils formed under stands of mixed hardwoods in loamy and clayey residuum derived from limestone bedrock.

In a representative profile the surface layer is 3 inches of black loam, and the subsurface layer is about 5 inches of dark grayish-brown loam. The subsoil, about 30 inches thick, is dark-brown loam in the upper 5 inches and dark-brown and yellowish-red clay loam in the lower 25 inches. It is underlain by brownish-yellow, calcareous dolomite that is interlaid with thin lenses of sandstone and shale.

Natural fertility, available water capacity, and permeability are moderate in Mifflin soils.

These soils are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. The soils also are suited to pasture, trees, and wildlife habitat.

If these soils are cultivated, contour stripcropping, diversions, terraces, and grassed waterways are needed to help control erosion. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure are other helpful practices.

An undisturbed profile within an area of Mifflin loam, 6 to 12 percent slopes, eroded (NW¼NE¼ sec. 6, T. 2 N., R. 6 E.):

A1—0 to 3 inches, black (10YR 2/1) loam; moderate, fine, granular structure; friable; slightly acid; clear, wavy boundary.

A2—3 to 8 inches, dark grayish-brown (10YR 4/2) loam; moderate, thin, platy structure; friable; medium acid; clear, wavy boundary.

B1—8 to 13 inches, dark-brown (7.5YR 4/4) heavy loam; moderate, fine, subangular blocky structure; friable; discontinuous, bleached silt coats; medium acid; clear, wavy boundary.

B21t—13 to 21 inches, dark-brown (7.5YR 4/4) clay loam; fine, medium, subangular blocky structure; firm; thin, discontinuous, dark reddish-brown (5YR 3/4) clay films; medium acid; clear, wavy boundary.

B22t—21 to 30 inches, dark-brown (7.5YR 4/4) heavy clay loam; moderate, medium, subangular blocky structure; very firm; thin, discontinuous, dark reddish-brown (5YR 3/4) clay films; medium acid; clear, wavy boundary.

B23t—30 to 38 inches, yellowish-red (5YR 4/6) heavy clay loam; moderate, medium, angular blocky structure; extremely firm; thin, continuous, dark reddish-brown (5YR 3/2) clay films.

R—38 to 60 inches, brownish-yellow (10YR 6/6) sandy dolomite.

The surface layer varies widely in texture within short distances. Loam is the dominant texture, but surface layers of sandy loam, silt loam, and loam are common. In places the A2 horizon is mixed with the Ap horizon. The subsoil is loam, sandy clay loam, sandy clay, or clay.

Depth to clayey residuum ranges from 20 to 36 inches. In places this material is missing from the profile. Depth to dolomite bedrock ranges from 36 to 50 inches. The usual depth is 36 to 40 inches.

Mifflin, Hixton, and NewGlarus soils are all underlain by dolomite bedrock. Areas of Mifflin soils are near areas of Hixton soils. The lower part of the solum in Mifflin soils formed in clayey dolomite residuum, but the lower part of the solum in Hixton soils formed in sandstone residuum. Mifflin soils generally lack the thicker loess mantle of typical NewGlarus soils, and their solum contains more sand than that of NewGlarus soils.

Mifflin loam, 6 to 12 percent slopes, eroded (MnC2).—This soil has the profile described for the series. The areas are on uplands in the middle and upper parts of hillsides. They are long and narrow and 75 to 180 acres in size. In cultivated areas the surface layer is 6 to 8 inches in thickness and dark grayish brown in color. In many places, however, dark yellowish-brown material that was formerly in the subsoil has been exposed in the surface layer.

Included with this soil in mapping are areas of Mifflin soils that have slopes of 2 to 6 percent. In these areas the hazard of erosion is moderate. Also included are areas of Mifflin, shallow solum variants, and areas where the surface layer is darker colored than that of this Mifflin soil and is 10 or more inches in thickness.

This soil is suited to all crops commonly grown in the county. Slope and moderate available water capacity limit use. Runoff is medium. Needed management practices are those that conserve moisture and control erosion. Capability unit IIIe-2; woodland group 1; wildlife group 1.

Mifflin loam, 12 to 20 percent slopes, eroded (MnD2).—This soil is on the middle and lower parts of hillsides in areas of 70 to 100 acres. Narrow drainageways commonly

cross the areas. Slopes are 100 to 150 feet long. In cultivated areas the surface layer is brown and 6 to 8 inches thick. In many areas this layer is silt loam or sandy loam. Much of the subsoil has been plowed into the surface layer.

This soil is slightly thinner over dolomite bedrock, but the profile otherwise is similar to that described for the series.

Included with this soil in mapping are areas of Mifflin, shallow solum variants, and areas where the surface layer is more than 10 inches thick and darker than the surface layer of this Mifflin soil. Also included are small areas where the soil is severely eroded.

If this soil is well managed, certain row crops can be grown in a cropping sequence. This soil is well suited to meadow, pasture, woodland, and wildlife habitat. Slope, rapid runoff, and moderate available water capacity limit use. The hazard of further erosion is very severe. Tilth is poor, and the content of organic matter is low. Practices that improve tilth, increase the content of organic matter, conserve moisture, and control erosion are helpful. Capability unit IVe-2; woodland group 1; wildlife group 1.

Mifflin Series, Shallow Solum Variant

These variants from the normal Mifflin soils are shallow and well drained. They are underlain, at a depth of less than 24 inches, by dolomite. Ground water is at a depth of more than 5 feet throughout the year. These soils formed under thin stands of mixed hardwoods in thin loamy and clayey residuum from dolomite bedrock.

In a representative profile the surface layer is about 7 inches of dark grayish-brown loam. The subsoil, about 11 inches thick, is dark-brown sandy clay loam in the upper 8 inches and dark-brown sandy clay in the lower 3 inches. It is underlain by fractured dolomite bedrock. Layers of sandstone and shale are in the fractured dolomite, and cracks in the dolomite are filled with material from the subsoil.

These soils are suited to all crops commonly grown in the county. The main crops are oats and alfalfa. The soils are better suited to meadow, pasture, woodland, and wildlife habitat, however, than to crops.

If these soils are cultivated, contour stripcropping, diversions, and grassed waterways are needed to help control erosion. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure help to improve fertility and tilth and to increase the content of organic matter.

Representative profile of Mifflin loam, shallow solum variant, 6 to 12 percent slopes, eroded, in a cultivated field (SW¼NE¼ sec. 18, T. 2 N., R. 6 E.):

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) loam; weak, medium, subangular blocky structure; friable; slightly acid; gradual, smooth boundary.

B22t—7 to 15 inches, dark-brown (7.5YR 4/2) sandy clay loam; weak, medium, subangular blocky structure; firm; slightly acid; clear, smooth boundary.

B23t—15 to 18 inches, dark-brown (7.5YR 4/4) sandy clay; structureless; very firm; slightly acid; clear, wavy boundary.

IIR—18 to 40 inches, dolomite bedrock.

The surface layer varies widely in texture within short distances. Loam is the dominant texture, but sandy loam and silt loam are common. The B2t horizon is loam, sandy clay loam, sandy clay, or clay. Depth to clayey residuum ranges from 6 to 18 inches. In some areas clayey residuum is missing from the profile. Depth to dolomite is 12 to 24 inches.

Mifflin, shallow solum variants, Dunbarton, and Northfield soils all are underlain by bedrock at a depth of less than 24 inches. Mifflin, shallow solum variants, generally lack the loess mantle typical of Dunbarton soils. In Mifflin, shallow solum variants, the lower part of the solum formed in dolomite residuum, but in Northfield soils the lower part of the solum formed in sandstone residuum.

Mifflin loam, shallow solum variant, 6 to 12 percent slopes, eroded (MoC2).—This soil has the profile described as representative of the series. Areas are narrow and 25 to 95 acres in size. They are on uplands in the middle and lower parts of hillsides. Slopes are convex and 150 to 250 feet long. A few narrow drainageways cut the areas.

Included with this soil in mapping are small areas of Mifflin soils and a few small areas where erosion is severe.

If this soil is well managed, certain row crops can be grown in a cropping system; but the soil is better suited to meadow, pasture, woodland, and wildlife habitat. Slope, low available water capacity, and shallowness over bedrock limit use. Practices that improve tilth, increase the content of organic matter, conserve moisture, and control erosion are helpful. Capability unit IVe-3; woodland group 5; wildlife group 3.

Mifflin loam, shallow solum variant, 12 to 20 percent slopes, eroded (MoD2).—This soil is on the middle and lower parts of hillsides in areas of 25 to 100 acres. Narrow drainageways commonly cross the areas. Slopes are 100 to 150 feet long.

The surface layer of this soil is brown and 5 or 6 inches thick, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are a few areas of Sogn soils and normal Mifflin soils and a few areas where slopes are 20 to 30 percent.

This soil is better suited to meadow, pasture, woodland, and wildlife habitat than to crops. Slope, low available water capacity, and shallow depth to bedrock limit use. The hazard of further erosion is very severe. Runoff is rapid, tilth is very poor, and the content of organic matter is low. Practices that help to conserve moisture, control erosion, improve tilth and fertility, and maintain the content of organic matter are helpful. Capability unit VIe-3; woodland group 5; wildlife group 3.

Morley Series

The Morley series consists of deep, well-drained soils on glaciated uplands. Ground water is at a depth of more than 5 feet in these soils throughout the year. Morley soils formed under stands of mixed hardwoods in thin loess over silty clay loam glacial till. The loess is 8 to 15 inches thick and is over till that is 5 to 20 or more feet thick.

In a representative profile the surface layer is about 7 inches of brown silt loam. The subsoil, about 27 inches thick, is dark-brown silty clay loam in the upper and lower parts and dark yellowish-brown silty clay in the middle part. The substratum is yellowish-brown silty clay loam glacial till.

Natural fertility is moderate, and available water capacity is high in Morley soils. Permeability is moderately slow.

If these soils are well managed, they are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. These soils also are suited to pasture, woodland, and wildlife habitat. If they are cultivated, contour stripcropping, diversions, terraces, and grassed waterways help to control erosion. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure are other helpful practices.

Representative profile of Morley silt loam, 6 to 12 percent slopes, eroded, in a cultivated field (NE¼SW¼ sec. 22, T. 1 N., R. 6 E.):

Ap—0 to 7 inches, brown (10YR 4/3) heavy silt loam; fine subangular blocky structure; firm; neutral; abrupt, wavy boundary; many roots.

B21t—7 to 17 inches, dark-brown (10YR 4/3) silty clay loam; moderate, medium, subangular blocky structure; firm; thin, discontinuous, dark-brown (10YR 3/3) clay films; slightly acid; clear, wavy boundary.

B22t—17 to 26 inches, dark yellowish-brown (10YR 4/4) silty clay; moderate, medium, angular blocky structure; very firm; thin, continuous, dark-brown (7.5YR 3/2) clay films; slightly acid; clear, wavy boundary.

B3—26 to 34 inches, dark-brown (10YR 4/3) silty clay loam; moderate, medium, subangular blocky structure; very firm; moderately alkaline; slightly effervescent; clear, wavy boundary.

C—34 to 60 inches, yellowish-brown (10YR 5/4) silty clay loam; massive; very firm; moderately alkaline; effervescent.

The plow layer is dark grayish brown (10YR 4/2) or brown and dark brown (10YR 4/3). In many areas the former A2 horizon has been mixed into the Ap horizon. The silt mantle ranges from 8 to 15 inches in thickness. The subsoil, which formed in the underlying till, ranges from heavy silty clay loam to silty clay in texture and from 12 to 26 inches in thickness. High-chroma mottles are present in places in the lower part of the subsoil. Calcareous silty clay loam glacial till is at a depth of 20 to 40 inches.

Morley, Cadiz, Miami, and Fayette, loamy substratum, soils all are underlain by glacial till. Morley soils have a thinner silt mantle than that of Cadiz soils, most of the subsoil of which is loess. Morley soils have a subsoil that formed in silty clay loam glacial till, but the subsoil in Miami soils formed in loam till. Morley soils formed in a thinner silt mantle than Fayette, loamy substratum, soils.

Morley silt loam, 2 to 6 percent slopes, eroded (MrB2).—This soil is on ridgetops and upper parts of slopes in long areas of 25 to 105 acres. In cultivated areas the surface layer is mostly dark grayish brown, but in a few areas it is very dark grayish brown. Slopes are 150 to 250 feet long. Except for color of the surface layer the profile of this soil is similar to that described as representative of the series.

Included with this soil in mapping are areas of soils similar to Morley soils except that they are not eroded. Tilth of the soil is better in those areas, and content of organic matter is higher. Also included are small areas of Cadiz soils and areas where ground water is at a depth of 3 to 5 feet.

If this soil is well managed, it is well suited to all crops commonly grown in the county. Slope and moderately slow permeability limit use of this soil. Major management concerns are increasing the content of organic matter, improving tilth and fertility, and controlling erosion. Capability unit IIe-6; woodland group 2; wildlife group 2.

Morley silt loam, 6 to 12 percent slopes, eroded (MrC2).—This soil has the profile described as representative of the series. Areas are narrow, mostly uniform in shape, and 20 to 85 acres in size. In cultivated areas the plow layer is dark brown or brown and 6 to 8 inches thick, but in a few areas it is very dark grayish brown. In undisturbed areas the surface layer is thinner and darker than it is in cultivated areas. A few narrow drainageways cut the areas. Slopes are slightly convex and 100 to 150 feet long.

Included with this soil in mapping are small areas of Cadiz silt loam and areas where ground water is at a depth of 3 to 5 feet.

If this soil is well managed, it is suited to all crops commonly grown in the county. The major limitations to use are slope, a severe hazard of erosion, and moderately slow permeability. Major management concerns are controlling erosion, increasing the content of organic matter, and improving tilth and fertility. Capability unit IIIe-6; woodland group 2; wildlife group 2.

Morley silt loam, 12 to 20 percent slopes, eroded (MrD2).—This soil is in narrow areas of 20 to 50 acres. The areas are mostly uniform in shape. A few narrow drainageways cross the areas. Slopes are slightly convex and are 75 to 125 feet long. In cultivated areas the plow layer is brown and 6 to 8 inches thick, but in a few areas it is very dark grayish brown or dark brown. In undisturbed areas the surface layer is thinner and darker than it is in cultivated areas.

Included with this soil in mapping are small areas of Cadiz silt loam and areas where till is at a depth of less than 20 inches.

This soil is better suited to small grains, hay, pasture, woodland, and wildlife habitat than to other uses. Moderately steep slopes, runoff, and moderately slow permeability limit use. The hazard of further erosion is very severe. Major management concerns are controlling erosion, increasing the content of organic matter, and improving tilth and fertility. Capability unit IVe-6; woodland group 2; wildlife group 2.

Muscatine Series

The Muscatine series consists of deep, somewhat poorly drained soils on uplands, valley slopes, and benches. Ground water is at a depth of 1 to 3 feet during wet periods.

These soils formed under prairie grass in deep silty loess 4 to 8 feet thick. In glaciated areas are areas of Muscatine, loamy substratum, soils that have a thin layer of loamy glacial till beneath the loess. In unglaciated areas sandstone or dolomite bedrock is below the loess. Muscatine soils on benches are underlain by stratified fine and medium sand at a depth of 50 to 70 inches.

In a representative profile the surface layer and subsurface layer are very dark brown silt loam. These layers combined are about 11 inches thick. The subsoil, about 35 inches thick, is brown silt loam in the upper 11 inches and brown silty clay loam and light brownish-gray silt loam below. The subsoil is mottled throughout. The underlying substratum is light olive-gray silt loam.

Available water capacity and natural fertility are high in Muscatine soils. Permeability is moderate.

If these soils are adequately drained, they are suited to all crops commonly grown in the county. Crops are

poorer in undrained areas than in drained areas, especially alfalfa. All areas of these soils are suited to pasture and wildlife habitat. The root zone is restricted in places because of the seasonal high water table. In some areas flooding occurs during periods of prolonged rainfall, and water ponds in depressions. Tile drains and open ditches provide adequate drainage where suitable outlets are available. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure are other helpful practices.

Representative profile of Muscatine silt loam, 2 to 6 percent slopes, eroded, in a cultivated field (SE¼SE¼ sec. 19, T. 2 N., R. 9 E.):

Ap—0 to 9 inches, very dark brown (10YR 2/2) silt loam; weak, fine, granular structure; very friable; neutral; abrupt, smooth boundary.

A3—9 to 11 inches, very dark brown (10YR 2/2) silt loam; weak, very fine, subangular blocky structure; friable; neutral; gradual, wavy boundary.

B1—11 to 15 inches, brown (10YR 5/3) silt loam; common, medium, faint, dark-brown (7.5YR 4/4) and grayish-brown (10YR 5/2) mottles; moderate, fine, subangular blocky structure; firm; slightly acid; clear, wavy boundary.

B21t—15 to 22 inches, brown (10YR 5/3) heavy silt loam; common, medium, faint, dark-brown (7.5YR 4/4) and light brownish-gray (10YR 6/2) mottles; moderate, fine, subangular blocky structure; firm; thin, discontinuous, dark-brown (10YR 4/3) clay films; medium acid; clear, smooth boundary.

B22t—22 to 28 inches, brown (10YR 5/3) silty clay loam; common, medium, prominent, yellowish-brown (10YR 5/8) and light-gray (10YR 6/1) mottles; moderate, fine, subangular blocky structure; firm; thin, discontinuous, dark-brown (10YR 4/3) clay films; medium acid; gradual, smooth boundary.

B23g—28 to 36 inches, light brownish-gray (2.5Y 6/2) heavy silt loam; many, medium, prominent, strong-brown (7.5YR 5/8) mottles; moderate, medium, subangular blocky structure; firm; thin patchy clay films on vertical ped faces only; slightly acid; gradual, smooth boundary.

B3g—36 to 46 inches, light brownish-gray (2.5Y 6/2) silt loam; many, medium, prominent, strong-brown (7.5YR 5/6) mottles; weak, coarse, subangular blocky structure; firm; slightly acid; gradual, smooth boundary.

Cg—46 to 60 inches, light olive-gray (5Y 6/2) silt loam; few, coarse, prominent, strong-brown (7.5YR 5/6) mottles; massive; firm; neutral.

The Ap horizon is black (10YR 2/1), very dark brown (10YR 2/2), or very dark grayish brown (10YR 3/2). The solum ranges from 42 to 50 inches in thickness. Mottling varies slightly in depth and intensity from place to place.

Muscatine soils are near Ashdale, Ossian, and Stronghurst soils. They are not so well drained as Ashdale soils, but they are better drained than Ossian soils. Muscatine soils formed in silty loess, but the lower part of the subsoil in Ashton soils formed in clay residuum from dolomite. The Muscatine soils have a thicker and darker colored surface layer than that of Stronghurst soils.

Muscatine silt loam, 2 to 6 percent slopes, eroded (MsB2)—This soil has the profile described as representative of the series. Areas are 15 to 45 acres in size and irregular in shape. They are on the lower parts of hillsides. In cultivated areas the plow layer is mostly very dark brown, but in a few concave areas the color is darker. Slopes commonly are 75 to 125 feet long. Dolomite or sandstone bedrock is at a depth of 50 to 70 inches in most places.

Included with this soil in mapping are a few small areas of Fayette soils and small areas of nearly level and sloping soils.

If this soil is adequately drained, it is well suited to all crops commonly grown in the county. Row crops can be grown every year under a program of intensive management in which erosion is controlled. Capability unit IIw-2; woodland group 7; wildlife group 5a.

Muscatine silt loam, benches, 0 to 3 percent slopes (MtA).—This soil is on convex benches. Areas are 70 to 240 acres in size and irregular in shape. In cultivated areas the plow layer is almost uniformly black. Loose outwash sands are at a depth of 50 to 70 inches.

The substratum of this soil is stratified fine and medium sand, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are small areas where slopes are 4 or 5 percent. Also included are a few areas where the mantle of loess is 36 to 50 inches thick.

If this soil is adequately drained, it is well suited to all crops commonly grown in the county. If fertility and tilth are maintained, this soil can be farmed intensively. Capability unit IIw-2; woodland group 7; wildlife group 5a.

Muscatine silt loam, loamy substratum, 0 to 3 percent slopes (MuA).—This soil is on convex benches in glaciated valleys. Areas are 70 to 240 acres in size and irregular in shape. In cultivated areas the plow layer is almost uniformly black. Loamy glacial till is at a depth of 50 to 70 inches in this soil.

Included with this soil in mapping are small areas where slope is 4 or 5 percent. Also included are small areas of Ossian soils.

If this soil is adequately drained, it is well suited to all crops commonly grown in the county. If fertility and tilth are maintained, this soil can be farmed intensively. Capability unit IIw-2; woodland group 7; wildlife group 5a.

Myrtle Series

The Myrtle series consists of deep, well-drained soils on glaciated uplands and high benches in valleys. Ground water is at a depth of more than 5 feet throughout the year. These soils formed under stands of mixed hardwoods in moderately deep loess and loam glacial till.

In a representative profile the surface layer is about 7 inches of very dark brown silt loam, and the subsurface layer is about 6 inches of grayish-brown silt loam. The subsoil, about 57 inches thick, is brown silt loam and dark yellowish-brown silty clay loam in the upper part and strong-brown and yellowish-red clay loam in the lower part.

Available water capacity is high in these soils, and natural fertility is moderately high. Permeability is moderate. Reaction is medium acid or slightly acid in undisturbed areas.

Myrtle soils are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. These soils are also suited to pasture, woodland, and wildlife habitat. If the soils are cultivated, contour stripcropping, diversions, terraces, and grassed waterways help to control erosion. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure are other helpful practices.

Representative profile of Myrtle silt loam, 2 to 6 percent slopes, eroded, in a cultivated field (SE¼NW¼ sec. 32, T. 1 N., R. 8 E.):

Ap—0 to 7 inches, very dark brown (10YR 2/2) silt loam; moderate, fine, granular structure; friable; neutral; abrupt, smooth boundary.

A2—7 to 13 inches, grayish-brown (10YR 5/2) silt loam; moderate, medium, platy structure; friable; slightly acid; abrupt, smooth boundary.

B1—13 to 20 inches, brown (10YR 4/3) heavy silt loam; moderate, fine, subangular blocky structure; friable; strongly acid; clear, wavy boundary.

B21t—20 to 32 inches, dark yellowish-brown (10YR 4/4) light silty clay loam; moderate, fine, subangular blocky structure; firm; thin, discontinuous, dark yellowish-brown (10YR 4/4) light clay films; strongly acid; clear, wavy boundary.

B22t—32 to 42 inches, dark yellowish-brown (10YR 4/4) silty clay loam; moderate, medium, subangular blocky structure; firm; thin, continuous, very dark grayish-brown (10YR 3/2) clay films; strongly acid; clear, wavy boundary.

IIB23t—42 to 60 inches, strong-brown (7.5YR 5/6) clay loam; moderate, medium, subangular blocky structure; very firm; thin, continuous, dark-brown (7.5YR 3/2) clay films; medium acid; clear, wavy boundary.

IIB24t—60 to 70 inches, yellowish-red (5YR 4/6) clay loam; moderate, medium, subangular blocky structure; very firm; thin, discontinuous, dark reddish-brown (5YR 3/3) clay films; medium acid; clear, wavy boundary.

IIC—70 to 88 inches, brownish-yellow (10YR 6/6) light loam; massive; friable; moderately alkaline; effervescent.

The loess ranges from 30 to 50 inches in thickness. The Ap horizon is black (10YR 2/1), very dark brown (10YR 2/2), or very dark grayish brown (10YR 3/2). In places the A2 horizon is mixed with the Ap horizon. The B1 horizon is heavy silt loam or light silty clay loam. The B2t horizon, which formed in loess, is silty clay loam, and the IIB2t horizon, which formed in glacial till, is sandy clay loam or clay loam. In places the lower part of the subsoil in Myrtle soils is mottled. Calcareous loam or sandy loam till generally ranges from 60 to 80 inches in depth but in places is as deep as 92 inches. In places dolomite is at a depth of 50 to 70 inches.

Myrtle soils are near Flagg and Ogle soils. Their surface layer is darker colored than that of Flagg soils and slightly thinner than that of Ogle soils. Myrtle, Dodge, Durand, and Westville soils all are underlain by glacial till. Myrtle soils, however, are deeper to calcareous till than Dodge soils. They have more of their subsoil formed in silt than Durand soils. In Myrtle soils much of the subsoil formed in loess, but in Westville soils all of the subsoil formed in loamy till.

Myrtle silt loam, 2 to 6 percent slopes, eroded (MyB2).—This soil has the profile described as representative of the series. Areas are long and 75 to 265 acres in size. They are on ridgetops and the upper parts of hillsides. In cultivated areas the plow layer is almost uniformly very dark brown, but in a few areas it is black. Slopes are 200 to 300 feet long.

Included with this soil in mapping are small areas of Fayette silt loam, loamy substratum, and small areas of Flagg and Ogle soils. Also included are areas of soils that have 0 to 2 percent slopes, areas where ground water is at a depth of 3 to 5 feet during wet periods, and areas of uneroded soil similar to this Myrtle soil. Tilth is better and content of organic matter is higher in the uneroded soil than it is in this Myrtle soil.

If this soil is properly managed, it is well suited to all crops commonly grown in the county. The only limitation to use is the moderate hazard of further erosion. Chief concerns of management are maintaining the content of organic matter, improving tilth, increasing fertility, and controlling erosion. Capability unit IIe–1; woodland group 1; wildlife group 1.

Myrtle silt loam, 6 to 12 percent slopes, eroded (MyC2).—This soil is in narrow areas of 80 to 125 acres. The areas are nearly uniform in shape. In cultivated areas the plow layer is very dark grayish brown and 6 to 8 inches thick, but in a few areas it is very dark brown or dark brown. A few narrow drainageways commonly cross the areas. Slopes are slightly convex and 100 to 150 feet long.

The surface layer of this soil is lighter colored, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are small areas of Westville silt loam and areas where ground water is at a depth of 3 to 5 feet during wet periods.

If this soil is properly managed, it is suited to all crops commonly grown in the county. The only limitation to use is a severe hazard of further erosion. Chief management concerns are controlling erosion, increasing the content of organic matter, improving tilth, and increasing fertility. Capability unit IIIe–1; woodland group 1; wildlife group 1.

Navan Series

The Navan series consists of deep, poorly drained soils on low benches in old lake basins. Ground water is at or near the surface most of the year. These soils formed under sedges and grass and in a moderately thick deposit of loamy outwash underlain by clayey lake-laid sediment.

In a representative profile the surface layer is black silt loam about 12 inches thick, and the subsurface layer is very dark gray silt loam about 3 inches thick. The subsoil is about 21 inches thick. The upper 4 inches is dark-gray silty clay loam, and the next 6 inches is gray sandy clay loam. Below is 11 inches of gray and light olive-brown sandy clay loam and silty clay. The substratum of lacustrine sediment is gray, calcareous silty clay loam.

Natural fertility is medium in these soils. Available water capacity is high, and permeability is moderately slow. Reaction is moderately alkaline to neutral in undisturbed areas.

If these soils are adequately drained, they are suited to all crops commonly grown in the county. Undrained areas can be used for limited pasture, and they also provide good habitat for wildlife.

Unless these soils are drained, the water table is at a depth of less than 1 foot. The soils are also subject to frequent flooding. They are slow to warm in spring and quick to cool in fall. The main concerns of management are reducing wetness and the hazard of flooding, maintaining or improving tilth and fertility, and increasing soil temperature. If cultivated crops are grown, adequate drainage can be provided by using diversions that intercept runoff from slopes above and by using tile drains and open ditches. Keeping tillage to a minimum, doing all tillage at the proper time, and returning all crop residues to the soil are needed to maintain tilth and fertility.

Representative profile of Navan silt loam in an undisturbed area (SE¼SE¼ sec. 1, T. 2 N., R. 9 E.):

A1—0 to 12 inches, black (10YR 2/1) silt loam; weak, fine, granular structure; friable; mildly alkaline; clear, wavy boundary.

A3—12 to 15 inches, very dark gray (10YR 3/1) silt loam; weak, medium, subangular blocky structure; friable; mildly alkaline; clear, wavy boundary.

B21tg—15 to 19 inches, dark-gray (5Y 4/1) silty clay loam; few, fine, prominent, yellowish-brown (10YR 5/4) mottles; weak, coarse, platy structure that breaks to moderate, medium, subangular blocky; firm; thin discontinuous clay films; mildly alkaline; clear, wavy boundary.

B22tg—19 to 25 inches, gray (5Y 5/1) sandy clay loam; few, fine, prominent, yellowish-brown (10YR 5/4) mottles; weak, medium, subangular blocky structure; firm; thin, discontinuous, dark-gray (N 4/0) clay films; neutral; clear, wavy boundary.

B23tg—25 to 30 inches, light olive-brown (2.5Y 5/4) sandy clay loam; common, medium, prominent, yellowish-brown (10YR 5/8) mottles; weak, medium, subangular blocky structure; firm; thin, discontinuous, dark-gray (2.5Y 4/0) clay films; neutral; clear, wavy boundary.

IIB24tg—30 to 36 inches, equal parts of gray (5Y 6/1) and yellowish-brown (10YR 5/6) silty clay; moderate, medium, angular blocky structure; firm; thin, discontinuous, dark-gray (N 4/0) clay films; mildly alkaline; clear, wavy boundary.

IICg—36 to 60 inches, gray (5Y 6/1) silty clay loam; laminated; firm; moderately alkaline; effervescent.

In some places Navan soils have a surface layer of muck. In places the lower part of the subsoil is heavy silty clay loam. Thickness of the solum ranges from 24 to 40 inches. Depth to the IIB24tg horizon ranges from 20 to 36 inches.

Navan soils are next to Colwood and Sebewa soils. Their upper part formed in loamy outwash, but Colwood soils formed entirely in fine sand and silt. Navan soils are underlain by lacustrine sediment, unlike Sebewa soils which are underlain by sand and gravel outwash.

Navan silt loam (0 to 2 percent slopes) (Na).—This is the only soil of the Navan series mapped in the county. It is on benches in old basins of lakes. The areas are 20 to 80 acres in size and are irregular in shape. In cultivated areas the plow layer is almost uniformly black. In places water ponds in depressions.

Included with this soil in mapping are small areas of Hebron, mottled subsoil variant, and areas where the soil formed in less than 20 inches of loamy overwash.

If this soil is adequately drained and is otherwise well managed, it is suited to row crops, small grains, and hay. Undrained areas are well suited to forage, pasture, woodland, and wildlife habitat. Use of this soil is limited by the high water table, hazard of flooding, wetness, and low soil temperature. The chief concerns of management are controlling water and maintaining tilth and the content of organic matter. Capability unit IIw-1; woodland group 7; wildlife group 5b.

NewGlarus Series

The NewGlarus series consists of moderately deep, well-drained soils on uplands. These soils are underlain by dolomite bedrock. Ground water is at a depth of more than 5 feet throughout the year. NewGlarus soils formed under mixed hardwoods in a moderately thin layer of loess and in clayey material weathered from dolomite bedrock.

In a representative profile the surface layer is about 4 inches of very dark grayish-brown silt loam, and the subsurface layer is about 4 inches of brown silt loam. The subsoil, about 27 inches thick, is yellowish-brown silt loam and silty clay loam in the upper 15 inches and dark reddish-brown clay in the lower part. The underlying dolomite bedrock is fractured, and the cracks are filled with material from the subsoil.

Natural fertility and available water capacity are moderate in these soils. Permeability is moderately slow.

If these soils are managed properly, most areas are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. The soils are suited to pasture, woodland, and wildlife habitat. Many areas are wooded. Contour stripcropping, diversions, terraces, and grassed waterways help to control erosion in cultivated areas. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure are also helpful.

An undisturbed profile within an area of NewGlarus silt loam, 6 to 12 percent slopes, eroded (SE¼SW¼ sec. 2, T. 2 N., R. 6 E.):

A1—0 to 4 inches, very dark grayish brown (10YR 3/2) silt loam; moderate, very fine, granular structure; friable; slightly acid; abrupt, smooth boundary.

A2—4 to 8 inches, brown (10YR 5/3) silt loam; moderate, thin, platy structure; friable; medium acid; abrupt, smooth boundary.

B1—8 to 13 inches, yellowish-brown (10YR 5/4) silt loam; moderate, fine, subangular blocky structure; firm; slightly acid; clear, smooth boundary.

B21t—13 to 23 inches, yellowish-brown (10YR 5/4) silty clay loam; moderate, fine, subangular blocky structure; firm; thin, continuous, dark yellowish-brown (10YR 4/4) clay films; slightly acid; clear, smooth boundary.

IIB22t—23 to 35 inches, dark reddish-brown (2.5YR 3/4) clay; moderate, fine, subangular blocky structure; very firm; thin continuous clay films; slightly acid; clear, wavy boundary.

IIR—35 to 60 inches, fractured dolomite bedrock.

The Ap horizon ranges from 6 to 9 inches in thickness. It is dark grayish brown (10YR 4/2), very dark grayish brown (10YR 3/2), or brown (10YR 4/3). In many places the A2 horizon has been mixed with the Ap horizon by plowing. In severely eroded areas the A horizon is silt loam or silty clay loam in texture and brown (10YR 4/3) or dark yellowish brown (10YR 4/4) in color. The IIB22t horizon, which formed in clayey residuum, is 10 to 20 inches thick. The silt mantle is 15 to 30 inches thick. Dolomite bedrock is at a depth of about 20 to 40 inches.

NewGlarus soils are below areas of Palsgrove soils and above areas of Dunbarton soils. The NewGlarus, Dodgeville, and Mifflin soils are all underlain by bedrock at a depth of less than 40 inches. NewGlarus soils have a thinner and lighter colored surface layer than Dodgeville soils, and they are lower in content of sand than Mifflin soils. About half the subsoil in NewGlarus soils formed in clayey residuum, but in contrast only a small part of the subsoil in Palsgrove soils and most of the subsoil in Dunbarton soils formed in clayey residuum.

NewGlarus silt loam, 2 to 6 percent slopes, eroded (NgB2).—This soil is on broad ridgetops and the upper parts of hillsides in areas of 75 to 165 acres. Slopes are smooth and convex and are 150 to 200 feet long. The surface layer is slightly thicker than that in the profile described for the series. It is thicker and lighter colored in cultivated areas than it is in undisturbed areas.

Included with this soil in mapping are small areas of Ashdale soils. Also included are small areas where slopes are 6 to 8 percent.

If this soil is managed properly, it is suited to all crops commonly grown in the county. Because of the slope, low infiltration rate, and limited water capacity, practices are needed that control erosion and help to conserve much of the rain that falls. In addition practices that maintain or improve tilth and the content of organic matter are needed. Capability unit IIe–2; woodland group 1; wildlife group 1.

NewGlarus silt loam, 6 to 12 percent slopes, eroded (NgC2).—This soil has the profile described for the series. The areas are narrow and are in the middle of hillsides (fig. 4). They range from 40 to 60 acres in size. Slopes are smooth and convex, and they are 100 to 175 feet long. A few narrow drainageways cross the areas. The brown surface layer is thicker and lighter colored in cultivated areas than it is in undisturbed areas. Included with this soil in mapping are small areas of Dunbarton soils.

If this soil is managed properly, it is suited to all crops commonly grown in the county. The slope, limited water capacity, severe hazard of further erosion, and moderate depth to bedrock limit use. Practices that control erosion and conserve moisture are needed. Capability unit IIIe–2; woodland group 1; wildlife group 1.

NewGlarus silt loam, 12 to 20 percent slopes, eroded (NgD2).—This soil is on the lower parts of hillsides in narrow areas of 20 to 65 acres. Slopes are 50 to 100 feet long. In places topsoil has accumulated at the base of hillsides. The areas are crossed by many drainageways.

This soil is 20 to 26 inches thick over dolomite, but the profile otherwise is similar to that described for the series. The surface layer is brown. It is thinner and lighter colored in cultivated or eroded areas than it is in undisturbed areas.

Included with this soil in mapping are small areas of Dunbarton soils and areas where the plow layer is severely eroded. Also included, at the base of hillsides and in drainageways, are small areas of Chaseburg soils and of Fayette silt loam, valleys.

This NewGlarus soil is suited to small grains and forage crops, to pasture, to woodland, and to wildlife habitat. The main concerns of management are slope, the very severe hazard of further erosion, and limited thickness of the soil over bedrock. In cultivated areas practices are needed that control erosion, conserve moisture, improve tilth and fertility, and increase the content of organic matter. Capability unit IVe–2; woodland group 1; wildlife group 1.

NewGlarus silt loam, 20 to 30 percent slopes, eroded (NgE2).—This soil is on the lower parts of hillsides in narrow areas that range from 20 to 45 acres in size. Slopes are 50 to 100 feet long. Topsoil has accumulated in places at the base of hillsides, and drainageways are common. In cultivated areas the plow layer is brown and 5 to 7 inches thick. Many uncultivated areas are wooded.

This soil is 20 to 26 inches thick over dolomite, but the profile otherwise is similar to that described for the series.

Included with this soil in mapping are small areas of Dunbarton soils. Also included are small areas where the soil is severely eroded, in poor tilth, and low in content of organic matter. In places at the base of hillsides and in downslope drainageways are small areas of Chaseburg soils and of Fayette silt loam, valleys.

This NewGlarus soil is well suited to forage crops and to pasture, woodland, and wildlife habitat. The chief concerns of management are the slope, the very severe hazard of further erosion, and the limited thickness of the soil over bedrock. Pastured areas can be improved through renovation. Capability unit VIe–2; woodland group 1; wildlife group 1.

NewGlarus soils, 6 to 12 percent slopes, severely eroded (NIC3).—These soils occupy tracts in the middle and lower parts of hillsides. The areas range from 10 to 25 acres in size. Slopes are 100 to 150 feet long. The areas are crossed by many narrow drainageways.

Much of the original surface layer of these soils has been washed away, and plowing has mixed material from the subsoil with the remaining surface layer. The present surface layer is a mixture of brown to dark yellowish-brown heavy silt loam and silty clay loam 5 or 6 inches thick, but the profile otherwise is similar to that described for the series. The soils also are shallower to bedrock. Included in mapping are a few small areas of Dunbarton soils.

The content of organic matter is low in these soils, and tilth is very poor. Infiltration is low, and runoff is high.

If these soils are managed properly, they are suited to meadow, pasture, woodland, and wildlife habitat. Use of the soils is restricted because of the high runoff, severe hazard of further erosion, and limited water capacity. Stripcropping and diversions or terraces and other practices that help to control erosion are needed. Practices that improve tilth, increase the content of organic matter in the surface layer, and conserve moisture also are needed. Capability unit IVe–2; woodland group 5; wildlife group 1.

NewGlarus soils, 12 to 20 percent slopes, severely eroded (NID3).—These soils are on the lower parts of hillsides in narrow areas that range from 10 to 25 acres in size. Slopes are 50 to 100 feet long. In places topsoil from higher areas has accumulated at the bases of the hillsides. Many narrow drainageways cut the areas.

Much of the original surface layer of these soils has been washed away, and plowing has mixed material from the subsoil with the remaining surface layer. The present surface layer is a mixture of dark yellowish-brown heavy silt loam and silty clay loam 5 or 6 inches thick, but the profile otherwise is like that described for the series. Depth to bedrock also is less.

Included with these soils in mapping are small areas of Dunbarton and Sogn soils. Also included, at the base of hillsides and in drainageways, are small areas of Chaseburg soils and of Fayette silt loam, valleys.

The content of organic matter is low in these soils, and tilth is very poor. Infiltration is low, and runoff is rapid.

These soils are well suited to meadow, pasture, woodland, and wildlife habitat. The chief concerns of management are slope, very severe hazard of further erosion, and shallowness of the soils to bedrock. Pastures can be improved through renovation. Capability unit VIe–2; woodland group 5; wildlife group 1.

Northfield Series

The Northfield series consists of shallow, somewhat excessively drained soils on uplands, valley slopes, and benches. Ground water is at a depth of more than 5 feet

Figure 4.—**Typical area of NewGlarus silt loam, 6 to 12 percent slopes, eroded.**

throughout the year. These soils formed under mixed hardwoods in material weathered from sandstone bedrock.

In a representative profile the surface layer is 7 inches of dark grayish-brown light loam. The subsoil, about 9 inches thick, is brown loam in the upper part and yellowish-brown sandy loam in the lower part. The underlying sandstone bedrock is yellowish brown.

Available water capacity and natural fertility are low in Northfield soils. Permeability is moderate.

If these soils are well managed, most of them are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. Corn can be grown more safely on the less sloping soils. These soils are better suited to meadow, pasture, woodland, and wildlife habitat than to other uses.

If these soils are cultivated, contour stripcropping and grassed waterways help to control erosion. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure are other helpful practices.

Representative profile of Northfield loam, 6 to 12 percent slopes, eroded, in a cultivated field (NE¼NE¼ sec. 19, T. 3 N., R. 9 E.):

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) light loam; weak, medium, granular structure; very friable; slightly acid; abrupt, wavy boundary.

B2t—7 to 11 inches, brown (10YR 4/3) loam; moderate, fine, subangular blocky structure; friable; thin, discontinuous, dark-brown (10YR 3/3) clay films; slightly acid; clear, wavy boundary.

B3t—11 to 16 inches, yellowish-brown (10YR 5/4) sandy loam; weak, medium, subangular blocky structure; very friable; thin, patchy, dark yellowish-brown (10YR 4/4) clay films; medium acid; clear, wavy boundary.

R—16 to 60 inches, yellowish-brown (10YR 5/8) sandstone bedrock.

The Ap horizon is very dark gray (10YR 3/1), dark grayish brown (10YR 4/2), or brown (10YR 4/3) and 5 to 8 inches thick. In places the brown loam of the A2 horizon has been mixed into the Ap horizon. The subsoil ranges from loam to sandy clay loam to heavy sandy loam. Depth to iron-cemented sandstone bedrock ranges from 12 to 20 inches. Hardness of the bedrock is greater than 3 (Mohs' scale).

Northfield, Elkmound, Gale, and Hixton soils all are underlain by bedrock at a depth of less than 40 inches. Northfield soils are finer textured than Elkmound soils and coarser textured than Gale soils. They are shallower to sandstone bedrock than are Gale and Hixton soils.

Northfield loam, 2 to 6 percent slopes, eroded (NoB2).—This soil is on broad ridgetops and the upper parts of slopes. It is underlain by sandstone. Areas are 45 to 85 acres in size. Slopes are smooth and convex and are 150 to 200 feet long. This soil is slightly deeper to sandstone than the soil described as representative for the series.

Included with this soil in mapping are small areas of Hixton soils and small areas where slope is 6 to 8 percent.

If this soil is properly managed, it is suited to all crops commonly grown in the county. Erosion needs to be controlled because of slope and the shallow depth to bedrock. Because of the low available water capacity, practices are needed that help to conserve much of the rain that falls. Also needed are practices that improve tilth and increase the content of organic matter. Capability unit IIIe–3; woodland group 5; wildlife group 3.

Northfield loam, 6 to 12 percent slopes, eroded (NoC2).—This soil has the profile described as representative of the series. Areas are on the middle parts of slopes. They are narrow and 20 to 65 acres in size. Slopes are smooth and convex and are 100 to 175 feet long. A few narrow drainageways cross the areas.

Included with this soil in mapping are areas of Elkmound soils and areas of uneroded soil that is similar to this Northfield soil but has a darker surface layer.

This soil is better suited to small grains, meadow, pasture, trees, and wildlife habitat than to other uses. If the soil is carefully managed, however, certain row crops can be grown. Use is limited by slope and shallowness to bedrock. Moisture needs to be conserved and erosion controlled because of the low available water capacity and very severe hazard of further erosion. Capability unit IVe–3; woodland group 5; wildlife group 3.

Northfield loam, 12 to 20 percent slopes, eroded (NoD2).—This soil is in narrow areas of 10 to 45 acres on the lower parts of hillsides. In places topsoil has accumulated at the bases of the hillsides. Drainageways commonly cut the areas. Slopes are 50 to 100 feet long.

This soil is slightly thinner over sandstone, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are small areas of Elkmound soils and areas where the plow layer is severely eroded. Also included in places at the bases of slopes and in drainageways are small areas of Chaseburg soils and Fayette silt loam, valleys.

This soil is better suited to forage crops, pasture, woodland, and wildlife habitat than to other uses. Moderately steep slopes, a very severe hazard of further erosion, and limited thickness over bedrock are serious concerns of management. Pasture renovation and woodland and wildlife plantings help to control erosion. Capability unit VIe–3; woodland group 5; wildlife group 3.

Northfield loam, 20 to 30 percent slopes, eroded (NoE2).—This soil is on the lower parts of hillsides in narrow areas of 10 to 45 acres. In places topsoil has accumulated at the bases of hillsides. Drainageways commonly cut the areas. Slopes are 50 to 100 feet long.

This soil is 12 to 15 inches thick over sandstone, but the profile otherwise is similar to that described as repre-

sentative of the series. The plow layer is brown in cultivated areas.

Included with this soil in mapping are small areas of Elkmound soils, small areas of Steep stony and rocky land, and areas where the soil is severely eroded. Also included, at the bases of slopes and in narrow drainageways, are small areas of Fayette silt loam, valleys, and small areas of Chaseburg soils.

This soil is better suited to pasture, trees, and wildlife habitat than to other uses. Steep slopes, a very severe hazard of further erosion, and limited thickness over bedrock are serious concerns of management. Pasture renovation, tree planting, and plantings for wildlife habitat are helpful. Capability unit VIIe–3; woodland group 5; wildlife group 3.

Ockley Series

In the Ockley series are deep, well-drained soils that are underlain by sand and gravel. Ground water is at a depth of more than 5 feet throughout the year. Ockley soils formed under stands of mixed hardwoods in deep loamy outwash, 4 to 6 feet thick, and in thick deposits of sand and gravel outwash.

In a representative profile the surface layer is about 6 inches of dark grayish-brown loam. The subsoil, about 48 inches thick, is brown loam and sandy clay loam over dark yellowish-brown clay loam in the upper part and dark-brown sandy clay loam and sandy loam over reddish-brown gravelly clay loam in the lower part. The substratum is yellowish-brown sand and gravel.

Available water capacity and natural fertility are high in Ockley soils. Permeability is moderate.

These soils are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. These soils also are suited to pasture, woodland, and wildlife habitat. Ockley sandy loam is especially suited to irrigation.

If these soils are cultivated, contour stripcropping, diversions, terraces, and grassed waterways help to control erosion. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure are other helpful practices.

Representative profile of Ockley loam, 2 to 6 percent slopes, in a cultivated field (SE¼SW¼ sec. 1, T. 4 N., R. 8 E.):

Ap—0 to 6 inches, dark grayish-brown (10YR 4/2) loam; weak, fine, subangular blocky structure; friable; neutral; clear, wavy boundary.

B1—6 to 11 inches, brown (10YR 4/3) heavy loam; moderate, medium, subangular blocky structure; firm; slightly acid; gradual, wavy boundary.

B21t—11 to 19 inches, brown (10YR 4/3) sandy clay loam; moderate, medium, subangular blocky structure; firm; thin, discontinuous, dark-brown (10YR 3/3) clay films; slightly acid; gradual, wavy boundary.

B22t—19 to 27 inches, dark yellowish-brown (10YR 4/4) clay loam; moderate, medium, subangular blocky structure; firm; thin, discontinuous, dark-brown (7.5YR 4/4) clay films; medium acid; clear, wavy boundary.

B23t—27 to 33 inches, dark-brown (7.5YR 4/4) sandy clay loam; moderate, medium, subangular blocky structure; firm; thin, patchy, dark-brown (7.5YR 3/2) clay films on vertical and horizontal ped faces; slightly acid; clear, wavy boundary.

B31—33 to 49 inches, dark-brown (7.5YR 4/4) sandy loam; weak, coarse, subangular blocky structure; friable; strongly acid; clear, wavy boundary.

IIB32(beta)—49 to 54 inches, reddish-brown (5YR 4/4) gravelly clay loam; weak, medium, subangular blocky structure; very firm; slightly acid; abrupt, wavy boundary.

IIC—54 to 60 inches, yellowish-brown (10YR 5/8) sand and gravel outwash; moderately alkaline; effervescent.

The surface layer is silt loam, loam, or sandy loam. Color ranges from very dark grayish brown (10YR 3/2) in undisturbed areas to brown (10YR 4/3) in plowed areas or in areas of eroded soil. The silt mantle, if present, is 10 to 20 inches in thickness. The subsoil, always more than 20 inches thick, is sandy loam, loam, sandy clay loam, or clay loam. Loose sand and gravel outwash generally is at a depth of 40 to 60 inches, but in a few places it is at a depth of more than 60 inches.

Ockley soils are next to Fox and Oshtemo soils and above Sebewa and Thackery soils. Ockley soils are deeper to loose outwash than Fox soils. They are finer textured than Oshtemo soils and better drained than Sebewa and Thackery soils.

Ockley loam, 0 to 2 percent slopes (OeA).—This soil is on convex benches in valleys. Areas are irregular in shape and 20 to 60 acres in size. In cultivated areas the plow layer is almost uniformly dark grayish brown. The color is darker, however, in a few areas where slopes are concave.

This soil is slightly deeper to sand and gravel, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are small areas where slopes are 3 to 4 percent and a few small areas where ground water is at a depth of 3 to 5 feet during wet periods.

This soil is well suited to all crops commonly grown in the county. Lime is needed for good growth of legumes. If fertility and tilth are maintained, this soil can be farmed intensively. Capability unit I–3; woodland group 1; wildlife group 1.

Ockley loam, 2 to 6 percent slopes (OeB).—This soil has the profile described as representative of the series. Areas are on benches in valleys. They are irregular in shape and 45 to 85 acres in size. In cultivated areas the plow layer is almost uniformly dark grayish brown, but in a few areas where slopes are concave the color is darker. Slopes are commonly 175 to 225 feet long.

Included with this soil in mapping are a few small areas where ground water is at a depth of 3 to 5 feet in wet periods. Also included are small areas of nearly level and sloping soils.

This soil is well suited to all crops commonly grown in the county. Runoff is medium, and the hazard of further erosion is moderate in cultivated areas. Row crops can be grown most seasons if management is intensive and erosion is adequately controlled. Capability unit IIe–1; woodland group 1; wildlife group 1.

Ockley sandy loam, 0 to 3 percent slopes (OcA).—This soil is on benches of outwash plains. Areas are 25 to 80 acres in size and are irregular in shape. In cultivated areas the plow layer is almost uniformly dark grayish brown, but in a few areas where slopes are concave the color is darker.

This soil is coarser textured throughout, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are small areas where slopes are 4 or 5 percent and a few small areas of soils that have ground water at a depth of 3 to 5 feet

during wet periods. Also included are a few small areas where the surface layer is loam.

If this Ockley soil is properly managed, it is suited to row crops, small grains, and hay. If it is irrigated, it has high potential for all common crops. This soil is slightly droughty because of its coarse texture, and soil blowing is a hazard. Practices that conserve moisture, increase fertility, maintain the content of organic matter, and control erosion are helpful. Capability unit IIs–7; woodland group 3; wildlife group 1.

Ockley silt loam, 0 to 2 percent slopes (OkA).—This soil is on nearly level benches in valleys. Areas are 40 to 80 acres in size and irregular in shape. In cultivated areas the plow layer is almost uniformly dark grayish brown, but in a few areas where slopes are concave the color is darker.

This soil has a surface layer of silt loam, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are a few areas of soil that has ground water at a depth of 3 to 5 feet. Also included are a few small areas where the silt mantle is 20 to 36 inches in thickness.

If this soil is well managed, it is well suited to row crops, small grains, and hay. It can be farmed intensively. Practices that maintain tilth, fertility, and the content of organic matter are helpful. Capability unit I–3; woodland group 1; wildlife group 1.

Ockley silt loam, 2 to 6 percent slopes, eroded (OkB2).—This soil is on benches in valleys. Areas are long and 75 to 165 acres in size. In cultivated areas the plow layer is almost uniformly dark grayish brown, but in a few areas it is dark brown. Slopes are 150 to 250 feet long.

This soil has a surface layer of silt loam, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are a few small areas where the silt mantle is 20 to 30 inches thick. Also included are areas of soil similar to this Ockley soil except that it is uneroded. In these areas tilth of the soil is better and the content of organic matter is higher than it is in Ockley silt loam, 2 to 6 percent slopes, eroded.

If this soil is well managed, it is well suited to all crops commonly grown in the county. The only limitation to use is a moderate hazard of further erosion in cultivated areas. Chief management concerns are maintaining the content of organic matter, improving tilth and fertility, and controlling erosion. Capability unit IIe–1; woodland group 1; wildlife group 1.

Ockley silt loam, 6 to 12 percent slopes, eroded (OkC2).—This soil is in narrow areas of 40 to 80 acres. The areas are mostly uniform in shape. In cultivated areas the plow layer is 6 to 8 inches thick and mostly dark brown, but in a few areas it is dark grayish brown or brown. A few narrow drainageways cross the areas. Slopes are slightly convex and are 100 to 150 feet long.

This soil is slightly shallower to sand and gravel, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are small areas of Fox soils and small areas of Ockley loam.

If this soil is well managed, it is suited to all crops commonly grown in the county. A severe hazard of further erosion is the main limitation to use. Major management concerns are controlling erosion, increasing the content of organic matter, and improving tilth and fertility. Capability unit IIIe–1; woodland group 1; wildlife group 1.

Ogle Series

The Ogle series consists of deep, well-drained soils on glaciated uplands. Ground water is at a depth of more than 5 feet in these soils throughout the year. Ogle soils formed under prairie grasses in moderately deep loess over loamy glacial till.

In a representative profile the surface layer is 10 inches of black silt loam, and the subsurface layer is 6 inches of dark-brown silt loam. The subsoil is brown and dark yellowish-brown silt loam in the upper part, dark yellowish-brown and yellowish-brown silty clay loam in the middle part, and yellowish-red clay loam below.

Available water capacity and natural fertility are high in Ogle soils.

Ogle soils are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. These soils also are suited to pasture and wildlife habitat. If the soils are cultivated, contour stripcropping, diversions, terraces, and grassed waterways help to control erosion. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure are other helpful practices.

An undisturbed profile within an area of Ogle silt loam, 2 to 6 percent slopes, eroded (SW¼SE¼ sec. 10, T. 1 N., R. 7 E.):

A1—0 to 10 inches, black (10YR 2/1) silt loam; moderate, fine, granular structure; very friable; neutral; abrupt, wavy boundary.

A3—10 to 16 inches, dark-brown (10YR 3/3) silt loam; moderate, fine, granular structure; friable; slightly acid; clear, smooth boundary.

B1—16 to 25 inches, brown (10YR 4/3) silt loam; moderate, very fine, subangular blocky structure; friable; slightly acid; clear, smooth boundary.

B21t—25 to 31 inches, dark yellowish-brown (10YR 4/4) heavy silt loam; moderate, fine, subangular blocky structure; firm; thin, discontinuous, dark yellowish-brown (10YR 3/4) clay films; medium acid; clear, smooth boundary.

B22t—31 to 36 inches, dark yellowish-brown (10YR 4/4) silty clay loam; moderate, medium, subangular blocky structure; firm; thin, continuous, dark-brown (7.5YR 4/4) clay films; medium acid; clear, smooth boundary.

B23t—36 to 41 inches, yellowish-brown (10YR 5/4) silty clay loam; moderate, medium, subangular blocky structure; firm; thin, discontinuous, dark yellowish-brown (10YR 4/4) clay films; medium acid; clear, wavy boundary.

IIB24t—41 to 65 inches, yellowish-red (5YR 4/6) clay loam; weak, medium, subangular blocky structure; very firm; thin, discontinuous, dark reddish-brown (5YR 3/3) clay films; medium acid.

The loess ranges from 30 to 50 inches in thickness. The A1 horizon is black (10YR 2/1), very dark brown (10YR 2/2), or very dark grayish brown (10YR 3/2). The B21t and B22t horizons are heavy silt loam or silty clay loam. The B23t and IIB24t horizons are sandy clay loam or clay loam. In places the lower part of the subsoil is mottled. Depth to calcareous loam or sandy loam till generally ranges from 60 to 80 inches but occasionally is as much as 96 inches. In places this soil is underlain by dolomite at a depth of 5 to 8 feet.

Ogle, Durand, Myrtle, Saybrook, and Winnebago soils all are underlain by glacial till. A larger part of the subsoil in Ogle soils formed in loess than in Durand soils. Ogle soils have a thicker and darker colored surface layer than Myrtle soils, and they have a thicker solum than Saybrook soils. In Ogle soils only part of the subsoil formed in loamy till, but in Winnebago soils all the subsoil formed in this kind of material.

Ogle silt loam, 2 to 6 percent slopes, eroded (OIB2).—This soil has the profile described for the series. It is on ridgetops and the upper parts of hillsides. The areas are long and 75 to 265 acres in size. In cultivated areas the plow layer is almost uniformly black, but in a few areas it is very dark brown. Slopes are 200 to 300 feet long.

Included with this soil in mapping are small areas of Downs silt loam, heavy substratum, and areas where the soil is moderately well drained. Also included are areas where the soil is similar to this Ogle soil except that it is uneroded. In these areas tilth is better than that of this Ogle soil, and the content of organic matter is higher.

If this soil is well managed, it is well suited to all crops commonly grown in the county. The hazard of further erosion is moderate. Chief management concerns are maintaining tilth, maintaining the content of organic matter, and controlling erosion. Capability unit IIe–1; woodland group 12; wildlife group 4.

Ogle silt loam, 6 to 12 percent slopes, eroded (OIC2).—This soil is on slightly convex hillsides in narrow areas of 70 to 125 acres. The areas are mostly uniform in shape. The profile of this soil is similar to the one described for the soil series except that in cultivated areas the plow layer is 6 to 8 inches in thickness and mostly very dark brown in color. In a few places, however, this layer is very dark grayish brown or dark brown. A few narrow drainageways cut the areas. Slopes are 200 to 250 feet long.

Included with this soil in mapping are small areas of Durand silt loam and a few areas where the soil is moderately well drained.

If this soil is well managed, it is suited to all crops commonly grown in the county. The only limitation to use is a severe hazard of further erosion. Major management concerns are controlling erosion, increasing the content of organic matter, and improving tilth and fertility. Capability unit IIIe–1; woodland group 12; wildlife group 4.

Orion Series

The Orion series consists of deep, somewhat poorly drained soils that formed in alluvium on stream bottoms. Ground water is at a depth of 1 to 3 feet in wet periods. These soils formed under stands of mixed hardwoods in moderately thick, recent silty alluvium over deep, dark-colored, older silty alluvium. The recent alluvium is dark grayish brown and grayish brown because of material that was originally in higher, eroded soils and has accumulated on these soils. Flooding occurs frequently, and the floodwater continually deposits soil material on the surface of the Orion soils.

In a representative profile, the surface layer is about 8 inches of dark grayish-brown silt loam. Below this is 25 inches of stratified dark grayish-brown, grayish-brown, and very dark grayish-brown silt loam that has strong-brown and dark-brown mottles. At a depth of 33 inches is black and very dark gray silt loam that has dark reddish-brown mottles.

Available water capacity is high in Orion soils, and natural fertility is moderately high. Permeability is moderate. Reaction is neutral.

If Orion soils are well managed, they are suited to all crops commonly grown in the county except alfalfa. Prolonged rainfall or frequent flooding and consequent ponding make cultivation difficult. Crops in these soils grow well if they are protected from overflow and adequately drained. Areas not suitable for drainage are better suited to pasture, woodland, or wildlife habitat.

Tile drains are unsatisfactory in Orion soils. Surface and open-ditch drainage generally will rid the soils of excess water. Practices that increase the content of organic matter and improve tilth are needed.

Representative profile of Orion silt loam, 0 to 3 percent slopes, in a cultivated field (SW¼SE¼ sec. 30, T. 2 N., R. 7 E.):

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; weak, very fine, subangular blocky structure; very friable; neutral; gradual, wavy boundary.

C1—8 to 26 inches, dark grayish-brown (10YR 4/2) silt loam; common, medium, prominent, strong-brown (7.5YR 5/8) and common, medium, faint, grayish-brown (10YR 5/2) strata; weak, thin, platy structure; friable; mildly alkaline; gradual, wavy boundary.

C2—26 to 33 inches, thin laminations of grayish-brown (10YR 5/2), dark grayish-brown (10YR 4/2), and very dark grayish-brown (10YR 3/2) silt loam; common, medium, distinct, dark-brown (7.5YR 4/4) mottles; medium, thin, platy structure; friable; mildly alkaline; abrupt, smooth boundary.

A11b—33 to 48 inches, black (N 2/0) silt loam; common, fine, prominent, dark reddish-brown (5YR 3/3) mottles; moderate, fine, subangular blocky structure; friable; mildly alkaline; clear, wavy boundary.

A12b—48 to 60 inches, very dark gray (N 3/0) silt loam; structureless (massive); very firm; mildly alkaline.

The black or very dark gray, buried A horizon ranges in depth from 20 to 40 inches. The low-chroma colors in this horizon are caused by the color of the parent material. In places thin layers of fine sand are in the buried layers. Mottles generally are at a depth of 8 to 18 inches.

Orion soils are near Orion, wet variants, and they occupy positions on the landscape similar to those of Otter soils. The surface layer of Orion soils is slightly lighter colored than that of Orion, wet variants, and lighter colored than that of Otter soils, which are similar to Orion soils in texture. Otter soils are more poorly drained than Orion soils.

Orion silt loam, 0 to 3 percent slopes (OnA).—This is the only soil of the Orion series mapped in the county. It is in long, narrow areas of 80 to 200 acres along streams on flood plains. In cultivated areas the plow layer is mostly dark grayish brown, but in a few depressional areas the color is darker. Included in mapping are small areas of Ettrick silt loam.

If this soil is adequately drained, it is suited to row crops, small grains, and hay. Undrained areas are better suited to pasture, trees, and wildlife habitat than to other uses. Use of this soil is limited by excess water and frequent flooding. Major management concerns are removing excess water, preventing flooding, and maintaining tilth and the content of organic matter. Capability unit IIw–13; woodland group 9; wildlife group 5a.

Orion Series, Wet Variant

These variants from the normal Orion soils are deep, poorly drained soils on broad flood plains. Ground water

is at or near the surface most of the year. These soils formed under stands of mixed hardwoods in moderately thick recent silty alluvium and deep, dark-colored, older silty alluvium. The recent silty alluvium is dark grayish brown and dark gray.

In a representative profile the upper 9 inches is very dark grayish-brown and very dark gray silt loam. Below this is 16 inches of dark-gray silt loam. The older alluvium, at a depth of 25 inches, is black silt loam underlain by black and very dark gray silty clay loam.

Available water capacity and natural fertility are high in these soils. Permeability is moderate. Reaction is neutral in undisturbed areas.

These soils are not well suited to crops. Most areas are better suited to pasture, woodland, or wildlife habitat. Flooding is frequent, and flood waters remain for long periods. Protection from overflow and removal of excess water by drainage are difficult. Pasture renovation and planting vegetation suitable for wildlife habitat are helpful.

Representative profile of Orion silt loam, wet variant, at an undisturbed site (SE¼SE¼ sec. 16, T. 2 N., R. 6 E.):

A11—0 to 2 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, medium, granular structure; friable; neutral; clear, smooth boundary.

A12g—2 to 9 inches, very dark gray (5Y 3/1) silt loam; moderate, medium, platy structure; friable; neutral; clear, smooth boundary.

Cg—9 to 25 inches, dark-gray (5Y 4/1) silt loam; moderate, medium, subangular blocky structure; friable; neutral; abrupt, smooth boundary.

A11b—25 to 28 inches, black (N 2/0) silt loam; structureless (massive); firm; neutral; clear, smooth boundary.

A12b—28 to 34 inches, black (10YR 2/1) silty clay loam; structureless (massive); firm; neutral; clear, smooth boundary.

A13bg—34 to 60 inches, very dark gray (N 3/1) silty clay loam; structureless (massive); firm; neutral.

Thickness and arrangement of horizons vary greatly because of stratification. In places thin layers of fine sand are in the upper horizons. These horizons are dark gray (5Y 4/1) or gray (5Y 5/1) in some areas.

Orion, wet variants, are near Orion soils. They are more poorly drained than Orion soils, and they have slightly darker and grayer surface layers. Their surface layer is lighter colored and lower in content of organic matter than that of Ettrick soils.

Orion silt loam, wet variant (0 to 2 percent slopes) (Or).—This is the only Orion, wet variant, soil mapped in the county. It is in low bottoms of stream valleys in long, narrow areas of 10 to 40 acres. In places this soil is in concave depressions, and in these areas water ponds on the surface. Color and thickness of the surface layer vary slightly according to the kind of alluvium being deposited. Included in mapping are a few small areas of Orion and Ettrick soils.

This soil is better suited to pasture, woodland, and wildlife habitat than to other uses. Use is limited by the permanently high water table, a lack of suitable outlets for drainage, and a severe hazard of flooding. Capability unit Vw-14; woodland group 9; wildlife group 5b.

Oshtemo Series

The Oshtemo soils consist of deep, well-drained soils that are underlain by sand and gravel. Ground water is at a depth of more than 5 feet in these soils throughout the year. Oshtemo soils formed under stands of mixed hardwoods in deep, moderately coarse textured outwash.

In a representative profile the surface layer is 7 inches of brown loamy sand. The subsoil, about 41 inches thick, is dark yellowish-brown sand and sandy loam or gravelly sandy loam in the upper 22 inches and strong-brown loamy sand in the lower 19 inches. The substratum is yellowish-brown sand and gravel.

Available water capacity and natural fertility are moderate in these soils. Permeability is moderately rapid.

If these soils are well managed, they are suited to row crops, small grains, and hay. They also are suited to woodland, pasture, and wildlife habitat. Special crops such as green peppers, snap beans, tomatoes, and potatoes grow well in irrigated areas. Major limitations to use are slope, moderate available moisture capacity, and moderate natural fertility. If these soils are cultivated, contour stripcropping, wind stripcropping, and grassed waterways help to control soil blowing and water erosion. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure are other helpful practices.

Representative profile of Oshtemo loamy sand, 2 to 6 percent slopes, eroded, in a cultivated field (NE¼NE¼ sec. 15, T. 2 N., R. 9 E.):

Ap—0 to 7 inches, brown (10YR 4/3) loamy sand; weak, fine, subangular blocky structure; very friable; neutral; abrupt, wavy boundary.

B1—7 to 10 inches, dark yellowish-brown (10YR 4/4) loamy sand; weak, fine, subangular blocky structure; very friable; neutral; abrupt, wavy boundary.

B21t—10 to 20 inches, dark yellowish-brown (10YR 4/4) heavy sandy loam; weak, medium, subangular blocky structure; friable; thin, discontinuous, dark-brown (7.5YR 4/4) clay films; slightly acid; clear, wavy boundary.

B22t—20 to 29 inches, dark yellowish-brown (10YR 4/4) gravelly sandy loam; weak, medium, subangular blocky structure; friable; thin, discontinuous, dark-brown (7.5YR 4/4) clay films; medium acid; clear, wavy boundary.

B3—29 to 48 inches, strong-brown (7.5YR 5/6) heavy loamy fine sand; weak, medium, subangular blocky structure; very friable; slightly acid; clear, wavy boundary.

C—48 to 60 inches, yellowish-brown (10YR 5/6) sand and gravel; structureless; loose; moderately alkaline; effervescent.

The Ap horizon is dark grayish brown (10YR 4/2) or brown (10YR 4/3). The B2t horizons range in texture from gravelly sandy loam to sandy clay loam. The gravelly substratum is at a depth of 40 to 60 inches.

Oshtemo soils are next to Fox and Ockley soils, near Gotham soils, and above Matherton and Thackery soils. They are coarser textured than Fox, Ockley, and Thackery soils and deeper to calcareous outwash than Fox soils. Oshtemo soils are deeper to underlying material than Gotham soils, and they formed over calcareous outwash instead of acid outwash as Gotham soils. Oshtemo soils are better drained than Thackery soils.

Oshtemo loamy sand, 0 to 2 percent slopes (OsA).—This soil is on high benches in irregularly shaped areas of 20 to 60 acres. The profile of this soil is similar to the one described as representative for the series except that the surface layer is slightly darker, and depth to calcareous sand and gravel is greater. In cultivated areas the plow layer is almost uniformly dark grayish brown, but the color is darker in a few areas where slopes are concave.

Included in mapping are small areas where the surface layer is sandy loam.

These soils are suited to all crops commonly grown in the county. They are specially well suited to specialty crops if irrigation is provided. Management requirements in cultivated areas are conserving moisture, increasing the content of organic matter, improving fertility, and controlling soil blowing. Capability unit IIIs-4; woodland group 4; wildlife group 3.

Oshtemo loamy sand, 2 to 6 percent slopes, eroded (OsB2).—This soil has the profile described as representative of the series. It is on benches in irregularly shaped areas of 25 to 65 acres. In cultivated areas the plow layer is almost uniformly brown, but in a few concave areas the color is darker. Slopes are commonly 75 to 125 feet long. Included in mapping are small areas where the surface layer is sandy loam.

If irrigation is provided, this soil is suited to specialty crops and all crops commonly grown in the county. Management requirements are conserving moisture, increasing the content of organic matter, improving fertility, and controlling soil blowing and water erosion. Capability unit IIIs-4; woodland group 4; wildlife group 3.

Oshtemo loamy sand, 6 to 12 percent slopes, eroded (OsC2).—This soil is on smooth slopes in areas of 20 to 65 acres. The areas are mostly uniform in shape. The original surface layer was brown, but in most places dark yellowish-brown material formerly in the subsoil has been mixed with the remaining surface layer. A few narrow drainageways cross the areas. Slopes are 100 to 200 feet long.

This soil has lost 6 to 8 inches of its surface layer because of water erosion, but the profile otherwise is similar to that described as representative of the series. The surface layer of this soil is less friable and lower in fertility and content of organic matter than the soil described as representative of the series.

Included with this soil in mapping are small areas where slope is less than 6 percent or more than 12 percent. Also included are areas of Gotham soils that make up less than 10 percent of the total acreage.

If this soil is well managed, it is suited to row crops, small grains, and hay. Crops are difficult to irrigate because of slopes. Runoff is moderately rapid. Major management requirements are conserving moisture, increasing the content of organic matter, increasing fertility, and controlling water erosion and soil blowing. Capability unit IIIe-7; woodland group 4; wildlife group 3.

Ossian Series

The Ossian series consists of deep, poorly drained soils on low benches in valleys. Ground water is at or near the surface of these soils most of the year. Ossian soils formed under sedge and grass in deep silty material 5 to 10 feet thick. Beneath the silt, in most areas, is neutral sandy outwash.

In a representative profile the surface layer and subsurface layer combined are 16 inches of black silt loam. The subsoil, about 25 inches thick, is grayish-brown silt loam and olive-gray silty clay loam in the upper 14 inches and stratified, mottled, olive-gray silt loam, fine sand, and silt and clay in the lower 11 inches. The substratum is olive-gray silt loam.

Available water capacity and natural fertility are high in Ossian soils.

Drained areas are suited to row crops, small grains, and clover hay. Undrained areas are well suited to wildlife habitat and to pasture for limited use. These soils are better suited to open ditches and well-blinded tile drains than to other means of removing excess water. A few areas of soils covered by 4 to 12 inches of recent alluvium are subject to frequent flooding. Ossian soils are slow to warm in spring and quick to cool in fall. Keeping tillage to a minimum and cultivating only when the surface layer is dry, returning crop residue to the soil, and applying barnyard manure are helpful practices.

Representative profile of Ossian silt loam in an undisturbed site (NE¼NE¼ sec. 21, T. 2 N., R. 8 E.):

A1—0 to 11 inches, black (10YR 2/1) silt loam; moderate, fine, granular structure; friable; many roots; neutral; abrupt, wavy boundary.

A3—11 to 16 inches, black (N 2/0) silt loam; common, medium, prominent, yellowish-red (5YR 5/6) mottles; moderate, very fine, subangular blocky structure; friable; slightly acid; abrupt, wavy boundary.

B1g—16 to 19 inches, grayish-brown (2.5Y 5/2) heavy silt loam; many, medium, prominent, yellowish-red (5YR 5/6) mottles; moderate, fine, subangular blocky structure; firm; slightly acid; clear, wavy boundary.

B2g—19 to 30 inches, olive-gray (5Y 5/2) light silty clay loam; moderate, fine, subangular blocky structure; firm; slightly acid; clear, wavy boundary.

B3g—30 to 41 inches, olive-gray (5Y 5/2) silt loam; few very thin layers of fine sand, silt, and clay; few, fine, prominent, yellowish-red (5YR 5/6) mottles; weak, medium, subangular blocky structure; firm; slightly acid; abrupt, wavy boundary.

Cg—41 to 60 inches, olive-gray (5Y 5/2) silt loam; common, medium, prominent, strong-brown (7.5YR 5/6) mottles; massive; firm; neutral.

The solum ranges from 30 to 50 inches in thickness. In places in small areas the surface layer is muck. The subsoil ranges from silt loam to silty clay loam in texture. Thin layers of very fine sand are below a depth of 36 inches in most areas.

Ossian soils are below Stronghurst soils that have a loamy substratum, near Ettrick soils, and next to Orion and Otter soils along stream channels. Ossian soils are silty throughout, but Ettrick soils are loamy in the lower part of the B horizon. Ossian soils have a darker colored surface layer and lighter colored material in the lower part of the profile than Orion soils.

Ossian silt loam (0 to 2 percent slopes) (Ot).—This is the only Ossian soil mapped in the county. It is on low benches in valleys. Areas are 80 to 240 acres in size and irregular in shape. Water ponds in depressions.

Included with this soil in mapping are areas where the surface layer is mucky and areas where the soil is slightly better drained and has a lighter colored and thinner surface layer than this Ossian soil. Also included, in a few places, are areas where loose sand is at a depth of 40 to 60 inches.

This soil has poor surface drainage and poor internal drainage. Drainage must be improved for optimum production of crops. Open ditches and tile drains can be used. If the soil is cultivated when wet, soil structure and tilth are destroyed. Subsequent tillage operations are then very difficult to perform. If this Ossian soil is adequately drained, it is suited to row crops, small grains, and hay. Undrained areas are better suited to wildlife habitat, woodland, and pasture for limited use. Management should include artificial drainage and practices that maintain tilth

and improve fertility: Capability unit IIw-1; woodland group 7; wildlife group 5b.

Otter Series

The Otter series consists of deep, poorly drained soils on stream bottoms. Ground water is at or near the surface most of the year. Most Otter soils formed under prairie grasses in moderately deep, recent silty alluvium over buried, older silty alluvium. The material in which they formed is dark colored and is from eroded soils at higher elevation.

In a representative profile the upper 23 inches is black and very dark brown silt loam. Below this is 31 inches of black silty clay loam and silt loam. The substratum is dark-gray silt loam.

Available water capacity and natural fertility are high in Otter soils. Permeability is moderate. Reaction is neutral.

If these soils are adequately drained, they are suited to all crops commonly grown in the county. Otter soils in undrained areas are not so productive as Otter soils in drained areas, however, and alfalfa especially needs to be grown in drained areas. In addition to drainage, timeliness of tillage and keeping it to a minimum, returning crop residue to the soil, and other practices that maintain tilth and fertility are useful.

These soils are subject to frequent flooding for short periods. Straightening of stream channels and providing dikes help to control the flooding. Excess water should be removed, and surface drains are needed in extremely wet areas. Diversions that intercept runoff from higher areas are helpful.

Representative profile of Otter silt loam at an undisturbed site (NE¼NW¼ sec. 20, T. 2 N., R. 8 E.):

A11—0 to 15 inches, black (10YR 2/1) silt loam; weak, very fine, subangular blocky structure; friable; neutral; clear, wavy boundary.

A12—15 to 23 inches, very dark brown (10YR 2/2) heavy silt loam; moderate, very fine, subangular blocky structure; friable; neutral; gradual, wavy boundary.

A13—23 to 28 inches, black (N 2/0) light silty clay loam; moderate, medium, subangular blocky structure; firm; neutral; gradual, wavy boundary.

A14—28 to 54 inches, black (N 2/0) silt loam; moderate, medium, subangular blocky structure; firm; common, fine, prominent strong-brown (7.5YR 5/6) mottles; neutral; gradual, wavy boundary.

Cg—54 to 60 inches, dark-gray (N 4/0) silt loam; common, fine, prominent, strong-brown (7.5YR 5/6) mottles; massive; firm; neutral.

In places lighter colored layers of very fine sand and silt are in the upper horizons. In some places the more recent deposits of silty soil are more than 40 inches thick. The lower horizons are silt loam or light silty clay loam.

Otter soils are below areas of Huntsville soils and above areas of Orion soils. The Otter soils are more poorly drained than Huntsville soils and darker colored than Orion soils.

Otter silt loam (0 to 2 percent slopes) (Ou).—This is the only Otter soil mapped in the county. It is on low bottoms near streams in long, narrow areas of 25 to 100 acres. In places water ponds on this soil. Included in mapping are small areas of Ettrick soils.

If this soil is protected from overflow and adequately drained, it is well suited to all crops commonly grown in the county. Areas of this soil impractical to drain or inaccessible to heavy farm equipment are better suited to pasture or wildlife habitat. Use of this soil is limited by frequent flooding and by ponding. Major management concerns are removing excess water, preventing flooding, maintaining the content of organic matter, and maintaining tilth. Capability unit IIw-1; woodland group 9; wildlife group 5b.

Palms Series

The Palms series consists of deep, poorly drained, organic soils on low benches in valleys. Ground water is at or near the surface most of the year. These soils formed under sedge and grass in partly decayed organic residue 20 to 40 inches thick. The organic material is underlain by water-deposited silty material 3 or more feet thick.

In a representative profile, the upper 16 inches is black muck, and the next 10 inches is very dark grayish-brown peaty muck and very dark grayish-brown peat. The substratum, at a depth of 26 inches, is grayish-brown silt loam and silty clay loam.

Available water capacity is high in Palms soils and natural fertility is low. Permeability is moderately rapid in the upper part of the soil and moderate in the lower part. Reaction is slightly acid to mildly alkaline in the organic part of the soil and neutral or mildly alkaline in the mineral part.

Drained areas of Palms muck are suited to row crops, small grains, and clover hay. Undrained areas are well suited to wildlife habitat and pasture for limited use. Excess water should be removed from cultivated areas, and open ditches and tile drains are well suited to this use. Soil blowing is a moderate hazard in drained areas. Keeping tillage to a minimum, leaving crop residue on the surface of the soil, and maintaining fertility are helpful practices.

Representative profile of Palms muck in an undisturbed site (NW¼NW¼ sec. 6, T. 4 N., R. 9 E.):

Oa1—0 to 7 inches, black (N 2/0) muck; weak, fine, subangular blocky structure; very friable; slightly acid; clear, smooth boundary.

Oa2—7 to 11 inches, black (N 2/0) muck; weak, medium, subangular blocky structure; very friable; mildly alkaline; clear, smooth boundary.

Oa3—11 to 16 inches, black (N 2/0) muck; moderate, medium, subangular blocky structure; friable; mildly alkaline; gradual, smooth boundary.

Oa4—16 to 20 inches, very dark grayish-brown (10YR 3/2) peaty muck; weak, coarse, subangular blocky structure; friable; mildly alkaline; clear, smooth boundary.

Oa5—20 to 26 inches, very dark grayish-brown (10YR 3/2) sedge peat; matted; friable; mildly alkaline; abrupt, smooth boundary.

IICg—26 to 60 inches, grayish-brown (2.5Y 5/2) silt loam and light silty clay loam; massive; slightly sticky when wet; mildly alkaline.

The organic part of this soil ranges from muck to peat in texture, from black (N 2/0) to very dark grayish brown (10YR 3/2) in color, and from 20 to 40 inches in thickness.

Palms soils are near Adrian and Houghton soils. Their underlying material is finer textured than that of Adrian soils. Palms soils are thinner to underlying mineral material than Houghton soils.

Palms muck (0 to 2 percent slopes) (Pa).—This is the only Palms soil mapped in the county. It is in depressional areas on low benches in irregularly shaped areas of 20 to 80 acres.

Included with this soil in mapping are areas where the surface layer is mucky peat or peaty muck. Also included are areas that have organic material to a depth of more than 40 inches.

If this soil is adequately drained, it is suited to all crops commonly grown in the county. Undrained areas are better suited to pasture, marshhay, and wildlife habitat than to cultivated crops. Use of this soil is limited by a very high water table. Water ponds in depressions, and cattails and reeds grow well in these areas. Major management concerns are providing artificial drainage, controlling soil blowing, and increasing fertility. Capability unit IIw–8; woodland group 10; wildlife group 6.

Palsgrove Series

In the Palsgrove series are deep, well-drained soils in the unglaciated northern and western parts of the county. Ground water is at a depth of more than 5 feet in these soils throughout the year. The soils formed under stands of mixed hardwoods in moderately deep loess over clayey material weathered from dolomitic bedrock.

In a representative profile, the surface layer is 5 inches of very dark gray silt loam, and the subsurface layer is about 5 inches of brown silt loam. The subsoil, about 39 inches thick, is yellowish-brown silt loam and silty clay loam in the upper part and reddish-brown clay in the lower part. The underlying dolomitic bedrock is fractured, and the cracks are filled with material from the subsoil.

Available water capacity is high, and natural fertility is moderately high in Palsgrove soils. Permeability is moderately slow.

Palsgrove soils are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. They also are suited to pasture, woodland, and wildlife habitat. If these soils are cultivated, contour stripcropping, diversions, terraces, and grassed waterways help to control erosion. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure are other helpful practices.

An undisturbed profile within an area of Palsgrove silt loam, 2 to 6 percent slopes, eroded (SE¼NE¼ sec. 30, T. 1 N., R. 6 E.):

A1—0 to 5 inches, very dark gray (10YR 3/1) silt loam; weak, fine, granular structure; friable; medium acid; abrupt, wavy boundary.

A2—5 to 10 inches, brown (10YR 5/3) silt loam; moderate, thin, platy structure; friable; medium acid; abrupt, wavy boundary.

B1—10 to 16 inches, yellowish-brown (10YR 5/4) silt loam; moderate, fine, subangular blocky structure; firm; thick, continuous, bleached silt coats; slightly acid; gradual, wavy boundary.

B21t—16 to 21 inches, yellowish-brown (10YR 5/4) light silty clay loam; moderate, fine, subangular blocky structure; firm; thin, discontinuous, dark yellowish-brown (10YR 4/4) clay films; thin, patchy, bleached silt coats; medium acid; clear, wavy boundary.

B22t—21 to 29 inches, yellowish-brown (10YR 5/4) silty clay loam; moderate, medium, subangular blocky structure; firm; thin, discontinuous, dark yellowish-brown (10YR 4/4) clay films; strongly acid; clear, wavy boundary.

B31—29 to 41 inches, yellowish-brown (10YR 5/4) light silty clay loam; moderate, coarse, subangular blocky structure; firm; thin, patchy, dark yellowish-brown (10YR 4/4) clay films on vertical ped faces only; slightly acid; abrupt, wavy boundary.

IIB32—41 to 49 inches, reddish-brown (5YR 4/4) clay; moderate, fine, angular blocky structure; very firm; thin, patchy, dark reddish-brown (5YR 3/4) clay films or organic stains; neutral; abrupt, wavy boundary.

IIR—49 to 60 inches, brownish-yellow (10YR 6/8) dolomitic bedrock.

In cultivated areas the Ap horizon ranges from 7 to 9 inches in thickness and is dark grayish brown (10YR 4/2) in color. The clayey residuum ranges from 6 to 16 inches in thickness. It ranges from clay loam to clay in texture and from dark red (2.5YR 3/6) to reddish brown (5YR 4/4) in color. Dolomitic bedrock is at a depth of 36 to 60 inches.

Palsgrove soils are near Ashdale, Fayette, and NewGlarus soils. They have a thinner and lighter colored surface layer than that of Ashdale soils, and they have a thinner silt mantle than Fayette soils. Palsgrove soils have a thicker silt mantle than that of NewGlarus soils.

Palsgrove silt loam, 2 to 6 percent slopes, eroded (PgB2).—This soil has the profile described for the series. It is on broad ridgetops in areas of 45 to 95 acres. Slopes are smooth and convex, and they are 150 to 200 feet long. The plow layer is almost uniformly dark grayish brown in cultivated areas. The soil is underlain by limestone.

Included with this soil in mapping are small areas of Fayette soils. Also included are small areas where slope is 6 to 8 percent, and the hazard of erosion of the soil is severe.

If this soil is well managed, it is suited to all crops commonly grown in the county. Practices that help control erosion are needed because of slope. Also helpful are practices that maintain or improve tilth and maintain or increase the content of organic matter. Capability unit IIe–1; woodland group 1; wildlife group 1.

Palsgrove silt loam, 6 to 12 percent slopes, eroded (PgC2).—This soil is on the middle parts of hillsides in narrow areas of 20 to 65 acres. Slopes are smooth and convex and are 100 to 175 feet long. A few narrow drainageways commonly cross the areas. The surface layer is very dark gray in undisturbed areas of this eroded soil, but in cultivated areas the plow layer is almost uniformly dark grayish brown.

This soil is slightly thinner over bedrock, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are areas of NewGlarus soils that are 20 to 40 inches thick over dolomite.

This soil is suited to row crops, small grains, hay, pasture, woodland, and wildlife habitat. Use of this soil is limited mainly by slope. Practices that control erosion, improve tilth and fertility, and maintain the content of organic matter are helpful. Capability unit IIIe–1; woodland group 1; wildlife group 1.

Palsgrove silt loam, 12 to 20 percent slopes, eroded (PgD2).—This soil is in narrow areas of 20 to 65 acres. The surface layer is brown. In places topsoil from higher areas has accumulated at the base of slopes. Drainageways commonly cross the areas. Slopes are 50 to 100 feet long.

This soil is slightly thinner over dolomite, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are small areas of NewGlarus soils and small areas where the plow layer is severely eroded. In the latter areas the soil is low in content of organic matter and poor in tilth. Also

included, in places at the bases of slopes and in drainageways, are small areas of Fayette silt loam, valleys, and Chaseburg soils.

This soil is better suited to small grains, forage crops, pasture, woodland, and wildlife habitat than to other uses. If it is well managed, some row crops can be included in the cropping sequence. The hazard of further erosion is severe. If this soil is cultivated, returning crop residue to the soil, keeping tillage to a minimum, and applying barnyard manure are helpful practices. Capability unit IVe–1; woodland group 1; wildlife group 1.

Palsgrove silty clay loam, 12 to 20 percent slopes, severely eroded (PlD3).—This soil is on the lower parts of hillsides in narrow areas of 10 to 25 acres. The surface layer is dark yellowish brown. The subsoil is exposed in the plow layer in many places, and topsoil from higher areas has accumulated at the base of slopes. Drainageways commonly cross the areas. Slopes are 50 to 100 feet long.

The surface layer of this soil is 5 or 6 inches of dark yellowish-brown silty clay loam, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are small areas of NewGlarus soils that are 20 to 40 inches thick over dolomite. Also included, in places at the bases of slopes and in drainageways, are small areas of Fayette silt loam, valleys, and Chaseburg soils.

This soil is better suited to forage crops, pasture, woodland, and wildlife habitat than to other uses. The content of organic matter is low and the soil is very poor in tilth. The infiltration rate is low, and runoff is high. Moderately steep slopes and a severe hazard of further erosion are serious concerns of management. If this soil is cultivated, practices that control erosion and conserve moisture are helpful. Also helpful are practices that improve tilth and increase the content of organic matter. Capability unit VIe–1; woodland group 1; wildlife group 1.

Pecatonica Series

Pecatonica soils are deep, well-drained soils on glaciated uplands and on high benches in valleys. Ground water is at a depth of more than 5 feet in these soils throughout the year. Pecatonica soils formed under stands of mixed hardwoods in moderately deep loess over loamy glacial till.

In a representative profile the surface layer is 4 inches of very dark gray silt loam, and the subsurface layer is about 6 inches of grayish-brown, friable silt loam. The subsoil, about 70 inches thick, is brown silt loam over dark yellowish-brown silty clay loam in the upper 27 inches, and strong-brown clay loam below. The underlying calcareous loamy till is yellowish-brown in color.

Available water capacity is high in these soils, and natural fertility is moderately high. Permeability is moderate.

Pecatonica soils are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. These soils also are suited to pasture, woodland, and wildlife habitat. Contour stripcropping, diversions, terraces, and grassed waterways are practices that will help to control erosion in cultivated areas. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure are other helpful practices.

An undisturbed profile within an area of Pecatonica silt loam, 2 to 6 percent slopes, eroded (NE¼NE¼ sec. 30, T. 1 N., R. 9 E.):

A1—0 to 4 inches, very dark gray (10YR 3/1) silt loam; moderate, medium, granular structure; friable; slightly acid; abrupt, smooth boundary.

A2—4 to 10 inches, grayish-brown (10YR 5/2) silt loam; moderate, medium, platy structure; friable; slightly acid; abrupt, smooth boundary.

B1—10 to 16 inches, brown (10YR 4/3) heavy silt loam; thick, continuous, bleached silt coats; moderate, fine, subangular blocky structure; friable; medium acid; clear, smooth boundary.

B21t—16 to 24 inches, dark yellowish-brown (10YR 4/4) silty clay loam; moderate, fine, subangular blocky structure; firm; thin, discontinuous, dark yellowish-brown (10YR 3/4) clay films; strongly acid; clear, smooth boundary.

IIB22t—24 to 37 inches, dark yellowish-brown (10YR 4/4) silty clay loam; moderate, medium, subangular blocky structure; firm; thin, discontinuous, dark-brown (7.5YR 4/4) clay films; medium acid; clear, smooth boundary.

IIB23t—37 to 80 inches, strong-brown (7.5YR 5/6) clay loam; moderate, medium, subangular blocky structure; firm; thin, continuous, dark reddish-brown (5YR 3/2) clay films; slightly acid; clear, smooth boundary.

IIC—80 to 100 inches, yellowish-brown (10YR 5/4) loam till; massive; friable; moderately alkaline; effervescent.

The silty horizons range from 15 to 30 inches in thickness. The A1 horizon is very dark gray (10YR 3/1) or dark grayish brown (10YR 4/2) to dark brown (10YR 4/3) in color. In places the A2 horizon has been mixed with the Ap horizon by plowing. The B2t horizon ranges from heavy silt loam to silty clay loam. The IIB23t horizon is loam, sandy clay loam, or clay loam, and it is mottled in places. Calcareous loam or sandy loam till generally ranges in depth from 60 to 90 inches but in places is as deep as 100 inches. In places these soils are underlain by dolomite at a depth of 5 to 7 feet.

Pecatonica soils are near Dodge, Durand, Flagg, and Westville soils. Their solum is thicker than that of Dodge soils, and they have a lighter colored surface layer than the one in Durand soils. The subsoil in Pecatonica soils formed partly in loessal silt and partly in loamy till, but the subsoil in Westville soils formed almost entirely in loamy till. Less of the subsoil in Pecatonica soils than in Flagg soils formed in loessal silt.

Pecatonica silt loam, 2 to 6 percent slopes, eroded (PnB2).—This soil has the profile described for the series. It is on ridgetops and the upper parts of long, narrow areas of 85 to 260 acres. In cultivated areas the plow layer is almost uniformly dark grayish brown, but in a few areas it is very dark grayish brown. Slopes are 150 to 250 feet long.

Included with this soil in mapping are areas of soil similar to this Pecatonica soil except that it is uneroded. In these areas tilth is better, and the content of organic matter is higher than in this Pecatonica silt loam, 2 to 6 percent slopes, eroded. Also included are small areas of Flagg silt loam and areas where the seasonal water table is 3 to 5 feet below the surface.

If this soil is properly managed, it is well suited to all crops commonly grown in the county. The only limitation to use is the moderate hazard of further erosion. Major management concerns are improving tilth, increasing the content of organic matter, improving fertility, and controlling erosion. Capability unit IIe–1; woodland group 1; wildlife group 1.

Pecatonica silt loam, 6 to 12 percent slopes, eroded (PnC2).—This soil is on the slightly convex middle parts of slopes in narrow areas of 100 to 150 acres that are mostly uniform in shape. A few narrow drainageways cross the areas. Slopes are 125 to 200 feet long. In cultivated areas the plow layer is dark grayish brown and 6 to 8 inches thick, but in a few areas the color is darker. Except for color and thickness of the surface layer, the profile of this soil is similar to that described for the series.

Included with this soil in mapping are small areas of Westville silt loam and areas where the water table is at a depth of 3 to 5 feet in spring.

If this soil is well managed, it is suited to all crops commonly grown in the county. The only limitations to use are a severe hazard of further erosion and slope. Major management concerns are controlling erosion, increasing the content of organic matter, and improving tilth and fertility. Capability unit IIIe-1; woodland group 1; wildlife group 1.

Pecatonica silt loam, 12 to 20 percent slopes, eroded (PnD2).—This soil is on the lower parts of hillsides in narrow areas of 40 to 100 acres. The plow layer is brown in cultivated areas. In places topsoil from higher areas has accumulated at the bases of slopes. Drainageways commonly cross the areas. Slopes are 80 to 120 feet long.

This soil is slightly shallower to loam till, but the profile otherwise is similar to that described for the series.

Included with this soil in mapping are small areas where the soil is 40 to 46 inches thick over dolomite. Also included are small areas of Westville soils and areas where the plow layer is severely eroded. Soil in the latter areas is low in content of organic matter and poor in tilth.

This soil is better suited to small grains, forage crops, pasture, trees, and wildlife habitat than to other uses. Some row crops can be grown if the soil is well managed. The hazard of further erosion is severe. If this soil is cultivated, practices that control erosion and improve tilth and fertility are helpful. Capability unit IVe-1; woodland group 1; wildlife group 1.

Pillot Series

The Pillot series consists of deep, well-drained soils on benches in valleys. Ground water is at a depth of more than 5 feet in these soils throughout the year. Pillot soils formed under prairie grasses in moderately deep loess and acid sandy outwash.

In a representative profile the surface layer is about 8 inches of very dark brown silt loam, and the subsurface layer is about 7 inches of dark-brown silt loam. The subsoil, about 18 inches thick, is dark-brown and dark yellowish-brown silt loam and silty clay loam in the upper 14 inches and dark-brown loam in the lower 4 inches. The underlying sand is yellowish brown.

Available water capacity and natural fertility are moderate in Pillot soils. Permeability is moderate.

Pillot soils are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. They also are suited to pasture and wildlife habitat. If these soils are cultivated, contour stripcropping, diversions, terraces, and grassed waterways help to control erosion. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure are other helpful practices.

Representative profile of Pillot silt loam, 2 to 6 percent slopes, eroded, in a cultivated field (SW¼SW¼ sec. 9, T. 2 N., R. 9 E.):

Ap—0 to 8 inches, very dark brown (10YR 2/2) silt loam; moderate, very fine, subangular blocky structure; friable; neutral; abrupt, smooth boundary.

A3—8 to 15 inches, dark-brown (10YR 3/3) silt loam; moderate, fine, subangular blocky structure; friable; neutral; clear, smooth boundary.

B1—15 to 22 inches, dark-brown (10YR 4/3) heavy silt loam; moderate, fine, subangular blocky structure; firm; slightly acid; clear, smooth boundary.

B21t—22 to 25 inches, dark-brown (10YR 4/3) silty clay loam; moderate, fine, subangular blocky structure; firm; thin, discontinuous, dark-brown (10YR 3/3) clay films; slightly acid; clear, smooth boundary.

B22t—25 to 29 inches, dark yellowish-brown (10YR 4/4) silty clay loam; moderate, medium, subangular blocky structure; firm; thin, discontinuous, dark yellowish-brown (10YR 3/4) clay films; medium acid; clear, smooth boundary.

IIB23t—29 to 33 inches, dark-brown (10YR 4/3) loam; weak, medium, subangular blocky structure; firm; thin, discontinuous, dark yellowish-brown (10YR 4/4) clay films; medium acid; gradual, wavy boundary.

IIC—33 to 60 inches, yellowish-brown (10YR 5/6) sand; structureless (single grained); loose; medium acid.

The loess mantle ranges from 20 to 36 inches in thickness. The Ap horizon is black (10YR 2/1), very dark brown (10YR 2/2), or dark brown (10YR 3/4). The lower part of the B2t horizon and all of the B3 horizon, if present, formed in the underlying sandy outwash. Loamy sand or sand ranges in depth from 24 to 42 inches. Reaction of the sandy outwash ranges from pH 5.0 to 6.5.

Areas of Pillot soils are beside areas of Tama silt loam, benches, and areas of Tell soils. The Pillot soils are thinner to loose sand than Tama silt loam, benches. They have a thicker and darker colored surface layer than Tell soils.

Pillot silt loam, 0 to 2 percent slopes (PoA).—This nearly level soil is on benches in areas of 80 to 240 acres. The plow layer in cultivated areas is almost uniformly very dark brown, but in a few areas where slopes are concave, the color is darker.

The surface layer of this soil is thicker, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are small areas where slope is 3 or 4 percent and a few areas of Muscatine soils on benches. Also included are a few areas of moderately well drained soils and small areas where the soil is 42 to 48 inches thick over loose sand.

This soil is well suited to all crops commonly grown in the county. The only limitation to use is the moderate available water capacity. This soil can be farmed intensively if practices that maintain fertility and tilth and conserve moisture are applied. Capability unit IIs-1; woodland group 12; wildlife group 4.

Pillot silt loam, 2 to 6 percent slopes, eroded (PoB2).—This soil has the profile described as representative of the series. It is on benches in areas of 45 to 95 acres. Slopes are smooth and convex, and they are 150 to 200 feet long.

Included with this soil in mapping are small areas of Tama silt loam, benches. Also included are small areas where slopes are 6 to 8 percent and the hazard of erosion is severe.

If this soil is well managed, it is suited to all crops commonly grown in the county. Because of slope, control of erosion is needed. Also, because of the limited available water capacity, it is important for management to include practices that permit the soil to retain a maximum amount of the rain that falls. Other needed practices are those that help to maintain or improve tilth and increase the content of organic matter. Capability unit IIe-2; woodland group 12; wildlife group 4.

Pillot silt loam, 6 to 12 percent slopes, eroded (PoC2).—This soil is on the middle parts of hillsides on benches in narrow areas of 40 to 85 acres. Slopes are smooth and convex and are 100 to 175 feet long. A few narrow drainageways commonly cross the areas. The surface layer is dark brown.

This soil is slightly thinner over outwash, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are a few areas of Dakota soils, which are loamy rather than silty, and a few small areas where slope is 12 to 20 percent. Also included are a few small areas where the subsoil is sandy clay loam.

If this soil is well managed, it is suited to row crops, small grains, and hay. Use is limited by a severe hazard of further erosion and a moderate available water capacity. Helpful practices are those that control erosion, increase the content of organic matter, improve tilth, and conserve moisture. Capability unit IIIe-2; woodland group 12; wildlife group 4.

Plainfield Series

The Plainfield series consists of deep, excessively drained soils on benches in valleys. Ground water is at a depth of more than 5 feet in these soils throughout the year. These soils formed under black oaks in deep acid outwash sand.

In a representative profile the surface layer is about 9 inches of dark-brown loamy sand, and the subsoil is 12 inches of strong-brown medium sand. The substratum, at a depth of 21 inches, is yellowish-brown medium sand.

Available water capacity and natural fertility are very low in Plainfield soils. Permeability is rapid.

Plainfield soils are not well suited to most row crops but are suited to all other crops grown in the county. Certain row crops can be grown in a cropping sequence, however, if management is good. These soils dry out quickly, and ordinarily crops do not grow well in them; but if irrigation is provided they are suited to special crops such as green peppers, snap beans, cucumbers, and potatoes.

Control of soil blowing and water erosion and conservation of moisture are major management concerns. Row crops should not be grown without such control. Use of cover crops, wind stripcropping, and shelterbelts, and return of crop residue to the soil, are helpful in areas where row crops are grown.

Representative profile of Plainfield loamy sand, 0 to 6 percent slopes, eroded, in a cultivated field (NW¼ SW¼ sec. 22, T. 3 N., R. 9 E.):

Ap—0 to 9 inches, dark-brown (10YR 4/3) loamy sand; weak, very fine, granular structure; very friable; neutral; clear, wavy boundary.

B2—9 to 21 inches, strong-brown (7.5YR 5/6) medium sand; single grained; loose; medium acid; gradual, wavy boundary.

C2—21 to 60 inches, yellowish-brown (10YR 5/6) medium sand; single grained; loose; medium acid.

The Ap horizon is dark grayish brown (10YR 4/2) or dark brown (10YR 4/3). Reaction of the sand in these soils ranges from 4.5 to 6.0 pH.

Plainfield soils are near Billett and Gotham soils. They contain more weatherable mineral material than Boone soils, which are also sandy. Plainfield soils are coarser textured than Gotham soils, and their surface layer is lighter in color.

Plainfield loamy sand, 0 to 6 percent slopes, eroded (PrB2).—This is the only Plainfield soil mapped in the county. It is on outwash plains in areas of 25 to 240 acres. The areas are irregular in shape. The plow layer in cultivated areas is almost uniformly dark brown, but in a few concave areas the color is darker. Slopes generally are 75 to 125 feet long.

Included with this soil in mapping are a few small areas where the ground water is at a depth of 3 to 5 feet. Also included are small areas of sloping soils and areas of Gotham soils.

If this soil is well managed, it is suited to all crops commonly grown in the county. Applications of lime are required for good growth of legumes. Row crops can be grown most years if management is intensive, if irrigation is provided, and if soil blowing and water erosion are controlled. Capability unit IVs-3; woodland group 4; wildlife group 3.

Riverwash

Riverwash (Rh) consists of sandbars and gravel banks on bottom lands. Slopes are nearly level. In many areas the sand and gravel have been deposited so recently that little or no vegetation has grown. In other areas deposits have been in place long enough for willows, river birch, and scrub oak to become established.

Riverwash is loose and porous. As a result, available water capacity is very low, and the material is very droughty. The water table generally is at a depth of less than 1 foot, and the areas are subject to frequent flooding. Natural fertility is very low.

All areas of this land type are idle. It is suited neither to crops nor to pasture. Capability unit VIIIs-10; woodland group 11; wildlife group 8.

Rockton Series

The Rockton series consists of moderately deep, well-drained soils on uplands. They are underlain by dolomite. Ground water is at a depth of more than 5 feet in these soils throughout the year. Rockton soils formed under prairie grasses in moderately thin loamy glacial till over clayey residuum derived from dolomite bedrock.

In a representative profile, the surface layer is 15 inches of very dark grayish-brown and very dark brown silt loam. The subsoil, about 18 inches thick, is brown silt loam and dark-brown clay loam in the upper part and dark yellowish-brown clay loam over dark-brown clay in the lower part. The underlying dolomitic limestone bedrock is fractured, and the cracks are filled with material from the subsoil.

Available water capacity, natural fertility, and permeability are moderate in Rockton soils.

If these soils are well managed, they are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. The soils are suited to pasture and wildlife habitat. Contour stripcropping, diversions, terraces, and grassed waterways help to control erosion in cultivated areas. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure are other helpful practices.

Representative profile of Rockton silt loam, 6 to 12 percent slopes, eroded, in a cultivated field (NE¼NE¼ sec. 17, T. 1 N., R. 8 E.):

Ap—0 to 7 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, very fine, subangular blocky structure; friable; neutral; abrupt, smooth boundary.

A12—7 to 10 inches, very dark brown (10YR 2/2) silt loam; moderate, fine, granular structure; friable; slightly acid; clear, smooth boundary.

A3—10 to 15 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, fine, subangular blocky structure; friable; slightly acid; clear, smooth boundary.

B1—15 to 19 inches, brown (10YR 4/3) heavy silt loam; moderate, fine, subangular blocky structure; friable; slightly acid; clear, smooth boundary.

IIB21t—19 to 26 inches, dark-brown (10YR 4/3) light clay loam; moderate, medium, subangular blocky structure; firm; thin, discontinuous, dark yellowish-brown (10YR 4/4) clay films; medium acid; clear, smooth boundary.

IIB22t—26 to 30 inches, dark yellowish-brown (10YR 4/4) clay loam; moderate, medium, subangular blocky structure; firm; thin, discontinuous, dark-brown (7.5YR 4/4) clay films; medium acid; clear, smooth boundary.

IIIB23t—30 to 33 inches, dark-brown (7.5YR 4/4) clay; strong, medium, subangular blocky structure; extremely firm; thin, continuous, dark-brown (7.5YR 3/2) clay films; slightly acid; abrupt, smooth boundary.

IIIR—33 to 60 inches, brownish-yellow (10YR 6/8) dolomitic limestone bedrock.

The silt mantle, if present, ranges from 12 to 20 inches in thickness. The Ap horizon is 6 to 9 inches thick and black (10YR 2/1) to dark brown (10YR 3/3) in color. The B horizon ranges in color from dark yellowish brown (10YR 4/4) to reddish brown (5YR 4/4). The middle part of the subsoil is sandy clay loam or clay loam. The clayey residuum from dolomite generally is below the weathered till and above the limestone but in places is missing. Dolomitic bedrock is at a depth of 20 to 40 inches.

Rockton soils are on glaciated uplands below areas of Durand soils and above areas of Sogn soils. They are similar to Sogn and Whalan soils in that they are underlain by bedrock at a depth of less than 40 inches. Rockton soils are shallower to bedrock than Durand soils but deeper to dolomitic bedrock than Edmund and Sogn soils. They have a thicker and darker colored surface layer than Whalan soils.

Rockton loam, 6 to 12 percent slopes, eroded (RkC2).—This soil is on the middle parts of hillsides in narrow areas of 40 to 85 acres. A few narrow drainageways cut the areas. Slopes are smooth and convex, and they are 100 to 175 feet long. The surface layer is very dark brown.

This soil has a surface layer of loam, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are areas of Edmund soils that are 10 to 20 inches thick over dolomite. Also included are a few areas where the soil is 40 to 60 inches thick over dolomite.

If this soil is well managed, it is suited to all crops commonly grown in the county. Slope, runoff, and moderate available water capacity limit use. The hazard of further erosion is severe. Capability unit IIIe–2; woodland group 12; wildlife group 4.

Rockton loam, 12 to 20 percent slopes, eroded (RkD2).—This soil is on the lower parts of hillsides in narrow areas of 40 to 85 acres. The surface layer is very dark grayish-brown loam. In places topsoil from higher areas has accumulated at the bases of slopes. Drainageways commonly cut the areas. Slopes are 75 to 125 feet long.

This soil is 20 to 26 inches thick over dolomite and the surface layer is loam, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are small areas of Edmund soils that are 10 to 20 inches thick over dolomite and areas where the plow layer is severely eroded. Soil in the latter areas is low in content of organic matter and poor in tilth. Also included, in places at the bases of slopes and in drainageways, are areas of Downs silt loam, heavy substratum.

If this soil is well managed, it is suited to row crops, small grains, forage crops, pasture, and wildlife habitat. Moderately steep slopes, a very severe hazard of further erosion, and a limited thickness over bedrock are serious concerns of management. If this soil is cultivated, practices that help to control erosion and conserve moisture are useful. Capability unit IVe–2; woodland group 12; wildlife group 4.

Rockton silt loam, 2 to 6 percent slopes, eroded (RnB2).—This soil is on broad ridgetops and the upper parts of slopes in areas of 65 to 150 acres. Slopes are smooth and convex, and they are 150 to 200 feet long.

The surface layer of this soil is slightly thicker, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are small areas of soils that are 40 to 60 inches deep over dolomite. Available water capacity and natural fertility are higher in soils in these areas. Also included in places are small areas where slope is 6 to 8 percent and the hazard of erosion is severe.

If this soil is well managed, it is suited to all crops commonly grown in the county. Practices are needed that help to control erosion, because of slope and the consequent reduced infiltration rate. Also, because of the limited water capacity, practices are needed that conserve most of the rain that falls. In addition, practices that help to maintain or improve tilth and maintain or increase the content of organic matter are useful. Capability unit IIe–2; woodland group 12; wildlife group 4.

Rockton silt loam, 6 to 12 percent slopes, eroded (RnC2).—This soil has the profile described as representative of the series. It is on the middle parts of slopes in areas of 40 to 85 acres. A few narrow drainageways cut the areas. Slopes are smooth and convex, and they are 100 to 175 feet long.

Included with this soil in mapping are areas of Edmund soils. Depth to limestone in the Edmund soils is 10 to 20 inches.

If this soil is well managed, it is suited to all crops commonly grown in the county. Slope and moderate available water capacity limit use. Practices that conserve moisture and control erosion are needed because of the moderate available water capacity, severe hazard of further erosion, and moderate depth to bedrock. Capability unit IIIe–2; woodland group 12; wildlife group 4.

Rodman Series

In the Rodman series are soils that are very shallow to gravelly sand. They are excessively drained, gravelly soils on outwash plains. Ground water is at a depth of more than 5 feet in these soils throughout the year. Rodman soils formed under thin stands of black oak that had an understory of prairie grasses.

In a representative profile the surface layer is about 5 inches of very dark brown gravelly loam. The subsoil, about 4 inches thick, is dark yellowish-brown gravelly sandy loam. The substratum is light yellowish-brown, stratified, calcareous sand and gravel.

Available water capacity and natural fertility are very low in these soils. Permeability is rapid. Reaction is neutral to moderately rapid.

Rodman soils are very droughty and very low in natural fertility. It is difficult to maintain a good vegetative cover on these soils. They are better suited to pasture for limited use, woodland, or wildlife habitat. Pasture renovation, applying fertilizer, and using practices that help to conserve moisture are helpful when managing these soils. Rodman soils are a good source of sand and gravel.

Representative profile of Rodman gravelly loam, 2 to 12 percent slopes, at an undisturbed site (NE¼SW¼SE¼ sec. 21, T. 4 N., R. 9 E.):

A1—0 to 5 inches, very dark brown (10YR 2/2) gravelly loam; weak, fine, granular structure; very friable; mildly alkaline; abrupt, wavy boundary.

B2—5 to 9 inches, dark yellowish-brown (10YR 3/4) gravelly sandy loam; weak, medium, subangular blocky structure; very friable; moderately alkaline; clear, wavy boundary.

C1—9 to 20 inches, dark yellowish-brown (10YR 4/4) gravelly sand; single grained; loose; moderately alkaline; effervescent; gradual, wavy boundary.

C2—20 to 60 inches, light yellowish-brown (10YR 6/4) stratified sand and gravel; moderately alkaline; effervescent.

The A1 horizon is very dark brown (10YR 2/2), very dark grayish brown (10YR 3/2), or dark brown (10YR 3/3). The solum ranges from 6 to 15 inches in thickness.

Rodman soils are above areas of Fox and Ockley soils. They have a thinner subsoil than that of Fox or Ockley soils.

Rodman gravelly loam, 2 to 12 percent slopes (RoC).—This soil has the profile described as representative of the series. It is on outwash plains in areas of 10 to 45 acres. A few narrow drainageways cross the areas. Slopes are convex. Included in mapping are a few small areas of Fox and Oshtemo soils.

This soil is better suited to gravel pits, building sites, pasture for limited use, woodland, and wildlife habitat than to other uses. It is very droughty, has a very severe hazard of erosion, and is very low in natural fertility. Management concerns are conserving moisture, improving fertility, and preventing erosion by maintaining a good vegetative cover. Capability unit VIs-5; woodland group 6; wildlife group 8.

Rodman gravelly loam, 12 to 30 percent slopes (RoE).—This soil is on the lower parts of hillsides and on knobs of outwash plains in areas of 10 to 30 acres. The surface layer is very dark grayish brown. A few drainageways cross the areas.

This soil is slightly lighter in color, but the profile otherwise is similar to that described as representative of the series. Included in mapping are a few small areas of Oshtemo soils.

This Rodman soil is better suited to woodland and wildlife habitat than to other uses. It is very droughty, and the hazard of erosion is very severe. Natural fertility is very low. Management concerns are conserving moisture, preventing erosion, and maintaining a good cover of sod. Capability unit VIs-5; woodland group 6; wildlife group 8.

Saybrook Series

The Saybrook series consists of deep, well-drained soils on glaciated uplands and high benches in valleys. Ground water is at a depth of more than 5 feet in these soils throughout the year. Saybrook soils formed under prairie grasses in moderately deep loess over loam glacial till.

In a representative profile the surface layer is 8 inches of very dark brown silt loam, and the subsurface layer is 5 inches of dark-brown silt loam. The subsoil, about 26 inches thick, is dark yellowish-brown silty clay loam in the upper 17 inches and dark-brown clay loam below. The underlying till is yellowish-brown, calcareous loam.

Available water capacity is high, and natural fertility is moderately high in Saybrook soils. Permeability is moderate.

Saybrook soils are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. These soils also are suited to pasture and wildlife habitat. If they are cultivated, contour stripcropping, diversions, terraces, and grassed waterways help to control erosion. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure are other helpful practices.

An undisturbed profile within an area of Saybrook silt loam, 6 to 12 percent slopes, eroded (SW¼NE¼ sec. 31, T. 3 N., R. 8 E.):

A1—0 to 8 inches, very dark brown (10YR 2/2) silt loam; weak, fine, granular structure; friable; slightly acid; abrupt, wavy boundary.

A3—8 to 13 inches, dark-brown (10YR 3/3) silt loam; weak, fine, subangular blocky structure; friable; slightly acid; abrupt, wavy boundary.

B1—13 to 18 inches, dark yellowish-brown (10YR 4/4) light silty clay loam; moderate, medium, subangular blocky structure; firm; few patchy clay films on vertical ped faces only; slightly acid; clear, wavy boundary.

B21t—18 to 30 inches, dark yellowish-brown (10YR 4/4) silty clay loam; moderate, medium, subangular blocky structure; firm; thin, discontinuous, dark-brown (7.5YR 4/4) clay films; medium acid; clear, wavy boundary.

IIB22t—30 to 39 inches, dark-brown (7.5YR 4/4) clay loam; moderate, medium, subangular blocky structure; firm; thin, continuous, dark-brown (7.5YR 3/2) clay films; medium acid; abrupt, wavy boundary.

IIC—39 to 60 inches, yellowish-brown (10YR 5/4) loam till; massive; friable; moderately alkaline; effervescent.

The A1 horizon is black (10YR 2/1), very dark brown (10YR 2/2), or very dark grayish brown (10YR 3/2). The upper part of the subsoil formed in loess, and it ranges from silt loam to silty clay loam in texture. The lower part formed in calcareous till and is heavy loam or clay loam. The loess ranges from 20 to 36 inches in thickness. Depth to calcareous till ranges from 24 to 40 inches. The till generally is loam, but in a few places it is silt loam or sandy loam.

Saybrook soils are near Dodge and Downs, heavy substratum, soils and above Lamartine soils. They have a thicker

and darker colored surface layer than Dodge soils and a thinner silt mantle than Downs, heavy substratum, soils. Saybrook soils are better drained than Lamartine soils, and they have a darker colored surface layer.

Saybrook silt loam, 2 to 6 percent slopes, eroded (SaB2).—This soil is on ridgetops and the upper parts of slopes in long, narrow areas of 25 to 95 acres. In cultivated areas the plow layer is almost uniformly black, but in a few areas the color is lighter. Slopes are 150 to 250 feet long.

The surface layer of this soil is slightly thicker, but the profile otherwise is similar to that described for the series.

Included with this soil in mapping are areas of Lamartine soils and small areas of soils that have a mantle of silt that is more than 36 inches thick. Also included are areas where the soil is similar to that Saybrook soil except that it is uneroded. In these areas tilth of the soil is better and content of organic matter is higher than they are in this Saybrook soil.

If this soil is well managed, it is well suited to all crops commonly grown in the county. The moderate hazard of further erosion is the only limitation to use in cultivated areas. Major management concerns are maintaining the content of organic matter, maintaining tilth, increasing fertility, and controlling erosion. Capability unit IIe–1; woodland group 12; wildlife group 4.

Saybrook silt loam, 6 to 12 percent slopes, eroded (SaC2).—This soil has the profile described for the series. Slopes are slightly convex, and areas are 20 to 75 acres in size and nearly uniform in shape. In cultivated areas the plow layer is generally very dark brown and 6 to 8 inches thick. In a few places, however, the color is very dark grayish brown or dark brown. A few narrow drainageways cross the areas. Slopes are 100 to 150 feet long.

Included with this soil in mapping are small areas where the mantle of silt is thinner than that of this soil.

If this soil is managed properly, it is suited to all crops commonly grown in the county. A severe hazard of further erosion in cultivated areas is the only limitation to use. Major management concerns are control of erosion, maintenance of tilth and content of organic matter, and improvement of fertility: Capability unit IIIe–1; woodland group 12; wildlife group 4.

Saylesville Series

Saylesville soils are deep, well-drained soils on benches in old lake basins. Ground water is at a depth of more than 5 feet throughout the year in some areas of these soils and 3 to 5 feet in others. Saylesville soils formed under stands of mixed hardwoods in deep silt and clay lacustrine deposits.

In a representative profile the surface layer is 8 inches of dark-gray silt loam, and the subsurface layer is about 2 inches of brown silt loam. The subsoil, about 24 inches thick, is brown silt loam over dark yellowish-brown silty clay loam in the upper 14 inches and dark-brown silty clay below. The substratum is stratified, brown, calcareous silt and clay.

Available water capacity and natural fertility are high in Saylesville soils. Permeability is moderately slow.

Saylesville soils are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. These soils also are suited to woodland, pasture, and wildlife habitat.

If these soils are cultivated, contour stripcropping, diversions, terraces, and grassed waterways help to control erosion. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure are other helpful practices.

Representative profile of Saylesville silt loam, 2 to 6 percent slopes, eroded, in a cultivated field (NE¼SE¼ sec. 7, T. 3 N., R. 8 E.):

Ap—0 to 8 inches, dark-gray (10YR 4/1) silt loam; weak, fine, subangular blocky structure; friable; neutral; abrupt, wavy boundary.

A2—8 to 10 inches, brown (10YR 5/3) silt loam; weak, thin, platy structure; friable; slightly acid; clear, wavy boundary.

B1—10 to 15 inches, brown (10YR 4/3) silt loam; discontinuous bleached silt coats; weak, fine, subangular blocky structure; friable; neutral; clear, wavy boundary.

B21t—15 to 24 inches, dark yellowish-brown (10YR 4/4) silty clay loam; moderate, medium, subangular blocky structure; firm; thin, discontinuous, dark-brown (7.5YR 4/4) clay films; slightly acid; gradual, wavy boundary.

B22t—24 to 34 inches, dark-brown (7.5YR 4/4) silty clay; fine, distinct, strong-brown (7.5YR 5/6) mottles; strong, medium, angular blocky structure; firm; thin, continuous, dark-brown (7.5YR 3/2) clay films; slightly acid; clear, wavy boundary.

C—34 to 60 inches, brown (10YR 5/3) silty clay loam; many, fine, prominent, yellowish-brown (10YR 5/6) mottles; moderate, fine, subangular blocky structure grading to massive as depth increases; firm; moderately alkaline; effervescent.

The Ap horizon ranges from 6 to 9 inches in thickness. It is dark gray (10YR 4/1), dark grayish brown (10YR 4/2), or brown (10YR 4/3). Calcareous lacustrine sediment ranges in depth from 20 to 40 inches.

Saylesville soils are beside areas of Hebron soils and above areas of Del Rey soils. They lack the outwash overburden of Hebron soils, and they are better drained than Del Rey soils.

Saylesville silt loam, 2 to 6 percent slopes, eroded (ScB2).—This is the only Saylesville soil mapped in the county. It is on broad benches in old lake basins. Areas are 45 to 265 acres in size. Slopes are smooth and convex, and they are 150 to 200 feet long.

Included in places with this soil in mapping are small areas of Hebron and Del Rey soils. Also included are small areas of nearly level soils which are subject to ponding during wet periods.

If this soil is well managed, it is suited to all crops commonly grown in the county. Returning crop residue to the soil and growing deep-rooted crops help to reduce runoff and maintain permeability. Also needed are practices that maintain or improve tilth and maintain or increase the content of organic matter. Capability unit IIe–6; woodland group 2; wildlife group 2.

Sebewa Series

The Sebewa series consists of moderately deep, poorly drained soils on bottoms and low benches in valleys. Ground water is at or near the surface of these soils most of the year. Sebewa soils formed under sedges and grasses in thin silt over loamy glacial outwash.

In a representative profile the surface layer is 13 inches thick. The plowed upper part is black silt loam, and the lower part is black light silty clay loam. The

subsoil, about 21 inches thick, is gray silty clay loam over clay loam in the upper part and grayish-brown sandy loam in the lower part. The underlying calcareous sand and gravel is dark gray.

Available water capacity is moderate in Sebewa soils, and natural fertility is high. Permeability is moderate.

If these soils are adequately drained, they are suited to all crops commonly grown in the county. Areas of undrained Sebewa soils are better suited to wildlife habitat and pasture for limited use than to other uses. Thickness of the root zone is limited by the water table, which is at or near the surface most of the year. In places flooding occurs during periods of prolonged rainfall. Water ponds in depressions. These soils are not suited to tile drains, but open ditches provide adequate drainage in areas where suitable outlets are present. Timeliness of tillage and keeping it to a minimum, returning crop residue to the soil, and applying barnyard manure are helpful practices.

Representative profile of Sebewa silt loam in a cultivated field (NW¼NW¼ sec. 6, T. 4 N., R. 9 E.):

Ap—0 to 7 inches, black (10YR 2/1) silt loam; moderate, fine, subangular blocky structure; friable; moderately alkaline; clear, smooth boundary.

A12—7 to 13 inches, black (N 2/0) light silty clay loam; moderate, fine, subangular blocky structure; firm; moderately alkaline; gradual, smooth boundary.

B21t—13 to 18 inches, gray (5Y 5/1) light silty clay loam; few, fine, prominent, yellowish-brown (10YR 5/8) mottles; moderate, fine, prismatic breaking to moderate, very fine, subangular blocky structure; firm; thin discontinuous clay films; moderately alkaline; clear, smooth boundary.

IIB22tg—18 to 25 inches, gray (5Y 5/1) light clay loam; weak, medium, prismatic breaking to weak, medium, subangular blocky structure; firm; thin discontinuous clay films; moderately alkaline; clear, wavy boundary.

IIB22tg—18 to 25 inches, gray (5Y 5/1) light clay loam; weak, medium, prismatic breaking to weak, medium, subangular blocky structure; firm; thin discontinuous clay films; moderately alkaline; clear, wavy boundary.

IIB23tg—25 to 34 inches, grayish-brown (2.5Y 5/2) heavy sandy loam; weak, coarse, subangular blocky structure; friable; thin discontinuous clay films; moderately alkaline; clear, wavy boundary.

IICg—34 to 60 inches, dark-gray (5Y 4/1) fine sand and gravel; single grained; loose; moderately alkaline; effervescent.

The Ap horizon ranges from black to very dark grayish brown in color. The IIB2tg horizon is heavy loam, sandy clay loam, or clay loam. The B22tg horizon ranges in thickness from 10 to 20 inches. Calcareous sand and gravel are at a depth of 24 to 40 inches.

Sebewa soils are below areas of Matherton and Thackery soils. They are more poorly drained than Matherton soils, and their surface layer is thicker and darker colored than that of Thackery soils.

Sebewa silt loam (0 to 2 percent slopes) (Se).—This is the only Sebewa soil mapped in the county. It is on low benches in convex areas of 20 to 90 acres that are irregular in shape. Water ponds in depressions on this soil.

Included with this soil in mapping are small areas where the surface layer is loam or muck. Also included are a few small areas of Adrian soils.

If this soil is drained, it is suited to row crops, small grains, and hay. Undrained areas are better suited to wildlife habitat and pasture for limited use.

Wetness is the major concern of management, but the moderate natural fertility and restricted root zone are also concerns. The soil should be drained first, and then other management practices should be applied. Open ditches can be used to remove excess water. Capability unit IIw-5; woodland group 7; wildlife group 5b.

Shiffer Series

The Shiffer series consists of deep, somewhat poorly drained soils. These soils are on benches, and in places smaller areas are in valleys of major streams. Ground water is at a depth of 1 to 3 feet during wet periods. Shiffer soils formed under mixed hardwoods in loamy acid sand outwash.

In a representative profile the surface layer is 7 inches of very dark gray loam. The subsoil, about 23 inches thick, is yellowish-brown loam in the upper 10 inches and brown loam over grayish-brown loamy sand below. It is underlain by light brownish-gray, brownish-yellow, and yellowish-brown loose sand.

Available water capacity is moderate in Shiffer soils, and natural fertility is moderate to moderately low. Permeability is moderate. The content of organic matter is high.

If these soils are adequately drained, they are suited to row crops and small grains and to use as meadows. They also are suited to such special crops as sweet corn and beans. Drained and undrained areas are suited to woodland, pasture, and wildlife habitat. In places thickness of the root zone is restricted by a water table that fluctuates between depths of 1 and 3 feet during wet periods. Flooding occurs in places during periods of prolonged rainfall, and water ponds in depressions at those times. Open ditches are adequate for drainage where suitable outlets are available. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure are other helpful practices.

Representative profile of Shiffer loam, 0 to 3 percent slopes, in a cultivated field (SE¼NW¼ sec. 12, T. 2 N., R. 9 E.):

Ap—0 to 7 inches, very dark gray (10YR 3/1) light loam; weak, medium, subangular blocky structure; friable; neutral; abrupt, wavy boundary.

B21t—7 to 17 inches, yellowish-brown (10YR 5/4) loam; many, fine and medium, prominent, strong-brown (7.5YR 5/8) and common, fine, distinct, grayish-brown (10YR 5/2) mottles; moderate, medium, subangular blocky structure; friable; thin, discontinuous, dark yellowish-brown (10YR 4/4) clay films; slightly acid; clear, wavy boundary.

B22t—17 to 25 inches, brown (10YR 5/3) loam; many, medium, faint, grayish-brown (10YR 5/2) and prominent strong-brown (7.5YR 5/8) mottles; moderate, medium, subangular blocky structure; friable; thin, discontinuous, dark-brown (10YR 4/3) clay films; very strongly acid; abrupt, wavy boundary.

B3—25 to 30 inches, grayish-brown (10YR 5/2) loamy sand; many, medium, prominent, strong-brown (7.5YR 5/8) mottles; weak, fine, subangular blocky structure; very friable; very strongly acid; gradual, wavy boundary.

C—30 to 60 inches, varicolored light brownish-gray (10YR 6/2), brownish-yellow (10YR 6/6), and yellowish-brown (10YR 5/8) medium sand; single grained; loose; very strongly acid.

In the Ap horizon color is 2 or 3 in value and 1, 2, or 3 in chroma. The subsoil ranges from loam to loamy sand. Loose sand is at a depth of 24 to 40 inches.

Shiffer soils formed in material similar to that in which Dells, Lawler, and Meridian soils formed. Unlike Dells soils, which have a mantle of silt 20 to 36 inches thick, Shiffer soils have a solum that formed entirely in loamy outwash. Their surface layer is thinner and lighter in color than that of Lawler soils. Shiffer soils are more poorly drained than Meridian soils.

Shiffer loam, 0 to 3 percent slopes (SfA).—This is the only Shiffer soil mapped in the county. It is on low convex benches in areas of 20 to 80 acres that are irregular in shape. The surface layer generally is very dark gray, but in a few concave areas the color is darker.

Included with this soil in mapping are small areas of Marshan soils in depressions. Runoff water collects in these areas, and in places serious delays in tillage operations occur after periods of heavy rain. Also included are a few small areas of soil similar to this Shiffer soil, except the surface layer is sandy loam.

If this soil is adequately drained, it is suited to all crops commonly grown in the county. Use of this soil is limited by wetness and moderate natural fertility. Major management concerns are removing excess water, improving fertility, and maintaining the content of organic matter. Capability unit IIw-5; woodland group 7; wildlife group 5a.

Sogn Series

In the Sogn series are very shallow, well-drained soils that are underlain by dolomite bedrock. Most areas of these soils are in the unglaciated northern and western parts of the county. Ground water is at a depth of more than 5 feet throughout the year. Sogn soils formed under prairie grasses in thin loess over limestone bedrock.

In a representative profile the surface layer is about 9 inches of silt loam. The underlying dolomite bedrock is fractured (fig. 5), and in places cracks are filled with material from the surface layer.

Available water capacity is very low, and natural fertility is low in Sogn soils. Permeability is moderate.

These soils are better suited to pasture and wildlife habitat than to other uses. Trees can be planted in places, but growth is extremely slow. In many areas Sogn soils are used as a source for crushed rock. Special plantings are helpful if these soils are used for wildlife habitat, and pasture renovation is helpful if they are used for pasture.

Representative profile of Sogn silt loam, 2 to 12 percent slopes, at an undisturbed site (NE¼NE¼, sec. 31, T. 1 N., R. 7 E.):

A1—0 to 9 inches, very dark brown (10YR 2/2) silt loam; weak, fine, granular structure; friable; moderately alkaline; clear, wavy boundary.
IIR1—9 to 14 inches, disintegrated dolomite.
IIR2—14 to 60 inches, platy dolomite.

These soils range from 4 to 12 inches in thickness. In places dark reddish-brown clayey residuum is in cracks of dolomite, and in places the dolomite contains sandy layers. In many places rocks are on the surface and throughout the profile of these soils. In areas of eroded soils, chert fragments are on the surface and in the surface layer.

Sogn soils are below areas of Dunbarton and Edmund soils. They have a thicker and darker colored surface layer than that of Dunbarton soils. Sogn soils lack the clayey subsoil of Edmund soils.

Figure 5.—Exposed area of a Sogn silt loam showing fractured limestone bedrock.

Sogn silt loam, 2 to 12 percent slopes (SoC).—This soil has the profile described as representative of the series. It is on broad ridgetops and upper parts of hillsides in areas of 25 to 65 acres. Slopes are smooth and convex, and they are 150 to 200 feet long. Included with this soil in mapping are small areas of Edmund and Dunbarton soils.

If this soil is well managed, it is suited to pasture and wildlife habitat. Pasture renovation and special plantings are helpful. Capability unit VIs-5; woodland group 6; wildlife group 8.

Sogn silt loam, 12 to 30 percent slopes (SoE).—This soil is on the lower parts of hillsides in narrow areas of 10 to 25 acres. The surface layer is very dark grayish brown. In places topsoil from higher areas has accumulated at the bases of slopes. Drainageways commonly cross the areas. Slopes are 50 to 100 feet long.

This soil is slightly thinner, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are small areas of Dunbarton and Edmund soils that are 10 to 20 inches thick over dolomite. Also included, in places at the bases of slopes and in narrow drainageways, are small areas of Fayette silt loam, valleys, and Lindstrom soils.

This soil is better suited to pasture or wildlife habitat than to other uses. Steep and moderately steep slopes, a very severe hazard of erosion, and the limited thickness of the soil over bedrock are serious concerns of management. Pasture renovation helps in the control of erosion and conservation of moisture. Capability unit VIs-5; woodland group 6; wildlife group 8.

Steep Stony and Rocky Land

Steep stony and rocky land (Sp) is a moderately steep to very steep land type that has a thin covering of soil and outcrops of dolomite or sandstone. Thin stands of mixed hardwoods are in most areas.

Included with this land type in mapping are small areas of Eleva and Northfield soils and small areas of Dunbarton and Sogn soils. The Eleva and Northfield soils are underlain by sandstone, and the Dunbarton and Sogn soils are underlain by dolomite.

Available water capacity is low, and fertility is low in Steep stony and rocky land. Runoff is rapid. Areas without vegetative cover are subject to erosion, and sheet erosion and gullies are moderate in overgrazed areas. Range of slope is 20 to 65 percent.

This land type is not suited to crops. The less sloping and slightly deeper soil produces good stands of timber, but the steeper and shallower soil produces stunted trees that are far apart. Capability unit VIIs-6; woodland group 13; wildlife group 8.

Stronghurst Series

The Stronghurst series consists of deep, somewhat poorly drained soils on uplands, valley slopes, and benches throughout the county. Ground water is at a depth of 1 to 3 feet in these soils during wet periods.

Stronghurst soils formed under mixed hardwoods in deep silty loess 4 to 8 feet thick. Below the loess generally is sandstone or dolomite bedrock. Stronghurst silt loam, benches, soils are underlain by stratified sandy outwash; and Stronghurst silt loam, loamy substratum, soils are underlain by calcareous loamy glacial till.

In a representative profile the surface layer is 7 inches of dark-gray silt loam, and the subsurface layer is about 2 inches of grayish-brown silt loam. The subsoil, which has many mottles, is brown silt loam in the upper 5 inches; dark grayish-brown, strong-brown, and yellowish-brown silty clay loam in the next 21 inches; and gray silt loam in the lower 9 inches. Structure is subangular blocky. The substratum is gray silt loam.

Available water capacity and natural fertility are high in Stronghurst soils. Permeability is moderately slow.

If this soil is adequately drained, it is suited to row crops, small grains, and meadow. Crops do not grow so well in undrained areas as in drained areas, however, especially crops of alfalfa. The root zone is restricted in these soils by a water table that fluctuates between depths of 1 and 3 feet. In places flooding occurs during periods of prolonged rainfall, and water ponds in depressions at these times. Drain tile and open ditches will provide adequate drainage where suitable outlets are available. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure are other helpful practices.

Representative profile of Stronghurst silt loam, benches, 0 to 3 percent slopes, in a cultivated field (SE¼SE¼ sec. 18, T. 2 N., R. 8 E.):

Ap—0 to 7 inches, dark-gray (10YR 4/1) silt loam; weak, very fine, granular structure; friable; neutral; abrupt, smooth boundary.

A2—7 to 9 inches, grayish-brown (10YR 5/2) silt loam; few, fine, prominent, yellowish-brown (10YR 5/6) mottles; weak, thin, platy structure; friable; slightly acid; abrupt, wavy boundary.

B1—9 to 14 inches, brown (10YR 5/3) silt loam; many, fine, prominent, yellowish-brown (10YR 5/6) and common, medium, faint, dark grayish-brown (10YR 4/2) mottles; moderate, fine, subangular blocky structure; friable; slightly acid; clear, wavy boundary.

B21t—14 to 25 inches, dark grayish-brown (10YR 4/2) light silty clay loam; many, fine, prominent, strong-brown (7.5YR 5/8) and many, fine, faint, grayish-brown (10YR 5/2) mottles; moderate, fine, subangular blocky structure; firm; thin discontinuous clay films; medium acid; clear, wavy boundary.

B22tg—25 to 35 inches, variegated grayish-brown (2.5YR 5/2), strong-brown (7.5YR 5/8), and yellowish-brown (10YR 5/6) silty clay loam; moderate, fine, subangular blocky structure; firm; thin discontinuous clay films; medium acid; clear, smooth boundary.

B3g—35 to 44 inches, gray (5Y 5/1) silt loam; many, medium, prominent, dark-brown (7.5YR 4/4) mottles; weak, medium, prismatic breaking to weak, medium, subangular blocky structure; firm; thin patchy films on vertical ped faces only; slightly acid; clear, wavy boundary.

Cg—44 to 60 inches, gray (5Y 5/1) silt loam; few, prominent, dark-brown (7.5YR 4/4) mottles; massive; firm; neutral.

The solum ranges from 36 to 60 inches in thickness. The Ap horizon is dark gray (10YR 4/1), very dark grayish brown (10YR 3/2), or dark grayish brown (10YR 4/2). The underlying outwash sand in Stronghurst silt loam, benches, ranges in depth from 50 to 70 inches.

Stronghurst and Muscatine soils formed in silty material. Stronghurst soils are similar to Fayette soils, but they are more poorly drained. Their surface layer is thinner and lighter colored than that of Muscatine soils. Stronghurst soils formed entirely in silt, but the lower part of the subsoils in Palsgrove soils formed in clayey residuum derived from dolomite.

Stronghurst silt loam, 2 to 6 percent slopes (SsB).—This soil is in narrow areas of 15 to 45 acres on the lower parts of slopes. The plow layer in cultivated areas is almost uniformly dark gray, but in a few depressions color is darker. Slopes commonly are 75 to 125 feet long, and runoff is medium. Dolomite or sandstone bedrock generally is at a depth of 50 to 70 inches.

This soil is underlain by bedrock at a depth of 50 to 70 inches, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are a few small areas of well-drained Fayette soils and small areas where slope is more or less than that of this Stronghurst soil.

If this soil is well managed, it is well suited to all crops commonly grown in the county. In places artificial drainage is needed for desirable crop growth. Row crops can be grown most years if erosion is carefully controlled in a program of intensive management. Capability unit IIw-2; woodland group 7; wildlife group 5a.

Stronghurst silt loam, benches, 0 to 3 percent slopes (StA).—This soil has the profile described as representative of the series. It is on convex benches in valleys in irregularly shaped areas of 80 to 240 acres. The plow layer in cultivated areas is almost uniformly dark gray, but in a few depressions the color is darker.

Included with this soil in mapping are small areas where slope is 4 percent. Also included are a few small areas of Dells and Ossian soils and Fayette silt loam, benches.

This soil is well suited to all crops commonly grown in the county, but artificial drainage is needed for

optimum production. The soil can be farmed intensively if fertility and tilth are maintained. Capability unit IIw–2; woodland group 7; wildlife group 5a.

Stronghurst silt loam, loamy substratum, 0 to 3 percent slopes (SuA).—This soil is on convex crests of ridges in uplands. Areas are 60 to 160 acres in size and irregular in shape. In cultivated areas the plow layer is almost uniformly dark gray, but in a few concave areas color is darker.

This soil is underlain by loamy glacial till at a depth of 50 to 70 inches, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are small areas where slopes are 4 or 5 percent. Also included are a few small areas of well-drained Fayette soils and poorly drained Ossian soils.

This soil is well suited to all crops commonly grown in the county. Artificial drainage is needed for optimum growth. This Stronghurst soil can be farmed intensively if fertility and tilth are maintained. Capability unit IIw–2; woodland group 7; wildlife group 5a.

Sylvester Series

The Sylvester series consists of moderately deep, well-drained soils in the unglaciated part of the county. They are underlain by sandstone. Ground water is at a depth of more than 5 feet in these soils throughout the year. Sylvester soils formed under prairie grasses in moderately thin loess over sandy material that weathered from sandstone bedrock.

In a representative profile the surface layer is about 9 inches of black silt loam, and the subsurface layer is about 2 inches of very dark grayish-brown silt loam. The subsoil, about 21 inches thick, is dark-brown silt loam and dark-brown silty clay loam in the upper 11 inches and dark yellowish-brown silty clay loam and yellowish-brown loamy sand below. The substratum is brownish-yellow, weakly cemented sandstone.

Available water capacity, natural fertility, and permeability are moderate in Sylvester soils.

These soils are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. They also are suited to pasture and wildlife habitat.

If these soils are cultivated, contour stripcropping, diversions, terraces, and grassed waterways help to control erosion. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure are other helpful practices.

Representative profile of Sylvester silt loam, 2 to 6 percent slopes, eroded, in a cultivated area (SE¼NW¼ sec. 22, T. 3 N., R. 7 E.):

Ap—0 to 9 inches, black (10YR 2/1) silt loam; moderate, fine, granular structure; friable; neutral; clear, wavy boundary.

A3—9 to 11 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, fine, granular structure; friable; neutral; gradual, wavy boundary.

B1—11 to 14 inches, dark-brown (10YR 3/3) silt loam; moderate, fine, subangular blocky structure; firm; strongly acid; gradual, wavy boundary.

B21t—14 to 22 inches, dark-brown (10YR 4/3) light silty clay loam; moderate, fine, subangular blocky structure; firm; thin, discontinuous, dark-brown (10YR 3/3) clay films; strongly acid; gradual, wavy boundary.

B22t—22 to 25 inches, dark yellowish-brown (10YR 4/4) silty clay loam; moderate, fine, subangular blocky structure; firm; thin, discontinuous, dark yellowish-brown (10YR 3/4) clay films; strongly acid; clear, wavy boundary.

IIB3—25 to 32 inches, yellowish-brown (10YR 5/6) loamy sand; weak, fine, subangular blocky structure; friable; strongly acid; abrupt, wavy boundary.

IIR—32 to 60 inches, brownish-yellow (10YR 6/8) weakly cemented sandstone; strongly acid.

The silt mantle ranges from 14 to 34 inches in thickness. The Ap horizon ranges from 10 to 15 inches in thickness and from black (10YR 2/1) to dark brown (10YR 3/3) in color. The B1 and B2t horizons formed in loess. The B3 horizon is 4 to 10 inches of dark yellowish-brown (10YR 4/4) to yellowish-brown (10YR 5/6) loamy sand or sandy loam. Depth to sandstone bedrock ranges from 20 to 40 inches.

Sylvester soils are below Hixton and Northfield soils and alongside Gale soils. Their subsoil is mostly finer textured than that of Hixton or Northfield soils, and they are deeper to sandstone bedrock than Northfield soils. Sylvester soils have a thicker and darker colored surface layer than that of Gale soils.

Sylvester silt loam, 2 to 6 percent slopes, eroded (SyB2).—This soil has the profile described as representative of the series. It is on broad ridgetops and the upper parts of hillsides in areas of 25 to 85 acres. Slopes are smooth and convex, and they are 150 to 200 feet long.

Included with this soil in mapping are small areas of Tama soils and small areas where slopes are 6 to 8 percent.

If this soil is well managed, it is suited to all crops commonly grown in the county. Erosion control is needed because of slope and the consequent reduced rate of infiltration. Because of the limited water capacity, practices are needed that help to conserve much of the rain that falls. Other helpful practices are those that help to maintain or improve tilth and help to maintain or increase the content of organic matter. Capability unit IIe–2; woodland group 12; wildlife group 4.

Sylvester silt loam, 6 to 12 percent slopes, eroded (SyC2).—This soil is on the middle parts of hillsides in narrow areas of 20 to 65 acres. The surface layer is very dark brown. Slopes are smooth and convex, and they are 100 to 175 feet long. A few narrow drainageways cross the areas.

This soil is slightly thinner over bedrock, but the profile otherwise is similar to that described as representative of the series. Included in mapping are areas of Northfield soils.

If this soil is well managed, it is suited to all crops commonly grown in the county. Slope and moderate available water capacity seriously limit use. Practices that conserve moisture and control erosion are needed because of the severe hazard of further erosion and the moderate depth to bedrock. Capability unit IIIe–2; woodland group 12; wildlife group 4.

Tama Series

In the Tama series are deep, well-drained soils on uplands and benches. Ground water is at a depth of more than 5 feet in these soils throughout the year.

Tama soils formed under grasses in deep silty loess 4 to 8 feet thick. The loess generally is underlain by dolomite or sandstone bedrock, but Tama soils on benches are underlain, at a depth of 50 to 70 inches, by stratified fine or medium sand.

In a representative profile the surface layer is about 11 inches of very dark brown silt loam, and the subsurface layer is about 5 inches of very dark grayish-brown silt loam. The subsoil, about 33 inches thick, is dark yellowish-brown silt loam in the upper 12 inches and dark yellowish-brown silty clay loam over yellowish-brown silt loam below. The substratum is yellowish-brown silt loam.

Available water capacity and natural fertility are high in Tama soils. Permeability is moderate.

Tama soils are well suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. These soils also are suited to pasture and wildlife habitat. In cultivated areas, contour stripcropping, diversions, terraces, and grassed waterways help to control erosion. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure are other helpful practices.

Representative profile of Tama silt loam, 2 to 6 percent slopes, eroded, at an undisturbed site (NE¼NE¼ sec. 32, T. 1 N., R. 7 E.):

A1—0 to 11 inches, very dark brown (10YR 2/2) silt loam; moderate, medium, granular structure; very friable; mildly alkaline; abrupt, wavy boundary.

A3—11 to 16 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, fine, granular structure; friable; neutral; abrupt, wavy boundary.

B1—16 to 28 inches, dark yellowish-brown (10YR 3/4) silt loam; moderate, very fine, subangular blocky structure; friable; medium acid; clear, wavy boundary.

B21t—28 to 32 inches, dark yellowish-brown (10YR 4/4) light silty clay loam; thin discontinuous clay films; moderate, very fine, subangular blocky structure; friable; medium acid; clear, wavy boundary.

B22t—32 to 43 inches, dark yellowish-brown (10YR 4/4) silty clay loam; thin discontinuous clay films; moderate, fine, subangular blocky structure; firm; medium acid; clear, wavy boundary.

B3—43 to 49 inches, yellowish-brown (10YR 5/4) silt loam; moderate, medium, subangular blocky structure; firm; medium acid.

C—49 to 60 inches, yellowish-brown (10YR 5/4) silt loam; structureless; massive; firm; slightly acid.

The Ap horizon is black (10YR 2/1), very dark brown (10YR 2/2), or very dark grayish brown (10YR 3/2). The solum ranges from 40 to 60 inches in thickness.

Tama soils have a darker colored and thicker surface layer than associated Downs and Fayette soils. They have a thicker mantle of silt and a less clayey subsoil than associated Ashdale soils.

Tama silt loam, 2 to 6 percent slopes, eroded (TaB2).—This soil has the profile described as representative of the series. It is on gentle hillsides and knolls in areas of 15 to 65 acres that are irregular in shape. In cultivated areas the plow layer is almost uniformly very dark brown, but in a few concave areas the color is darker. Slopes are commonly 150 to 225 feet long. Runoff is medium. Dolomite or sandstone bedrock is at a depth of 50 to 70 inches in places.

Included with this soil in mapping are a few small areas of somewhat poorly drained Muscatine and well-drained Ashdale soils. Also included are small areas of nearly level and sloping soils.

This soil is well suited to all crops commonly grown in the county. Applications of lime are required for good growth of legumes. Row crops can be grown most years if erosion is controlled in a program of intensive management. Capability unit IIe–1; woodland group 12; wildlife group 4.

Tama silt loam, 6 to 12 percent slopes, eroded (TaC2).—This soil is on smooth slopes in areas of 20 to 45 acres. The areas are mostly uniform in shape. The surface layer is very dark brown. A few narrow drainageways cross the areas. Slopes are 100 to 300 feet long, and runoff is moderately rapid. Dolomite or sandstone bedrock is at a depth of 50 to 70 inches.

This soil has lost 2 to 5 inches of its surface layer by water erosion, but the profile otherwise is similar to that described as representative of the series. The surface layer is less friable, lower in content of organic matter, lower in fertility, and more difficult to keep in good tilth than Tama silt loam, 2 to 6 percent slopes, eroded.

Included in places with this soil in mapping are small areas of gently sloping and moderately steep soils. Also included, and making up less than 10 percent of the total acreage, are areas of Ashdale soils.

This soil is suited to all crops commonly grown in the county. If it is well managed, crops grow well in it. Lime is needed for good growth of legumes. The major management concern is control of erosion. Practices that maintain or improve tilth, maintain or increase the content of organic matter, and maintain or improve fertility are helpful. Capability unit IIIe–1; woodland group 12; wildlife group 4.

Tama silt loam, benches, 0 to 2 percent slopes (TbA).—This soil is on convex benches in valleys in irregularly shaped areas of 80 to 240 acres. In cultivated areas the plow layer is almost uniformly black. Loose outwash sands are at a depth of 50 to 70 inches.

This soil has a sand substratum, but the profile otherwise is similar to that described as representative of the series.

Included in places with this soil in mapping are small areas where slopes are 3 or 4 percent. Also included are a few small areas of Ossian and Muscatine soils.

This soil is well suited to all crops commonly grown in the county. Lime is required for good growth of legumes. If this soil is fertilized, it can be farmed intensively. Capability unit I–3; woodland group 12; wildlife group 4.

Tama silt loam, benches, 2 to 6 percent slopes (TbB).—This soil is on gentle hillsides on benches in irregularly shaped areas of 75 to 135 acres. In cultivated areas the plow layer is almost uniformly black, but in a few areas the color is very dark brown. Slopes are commonly 100 to 200 feet long. Runoff is medium. Loose outwash sand is at a depth of 50 to 70 inches.

This soil has a substratum of sand, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are a few small areas of somewhat poorly drained Muscatine soils and well-drained Pillot soils. Also included are small areas of nearly level and sloping soils.

This soil is well suited to all crops commonly grown in the county. Lime is required for good growth of legumes. Row crops can be grown most years if management is intensive and erosion is carefully controlled. Capability unit IIe–1; woodland group 12; wildlife group 4.

Tell Series

The Tell series consists of deep, well-drained soils on benches in valleys. Ground water is at a depth of more than 5 feet in these soils throughout the year. Tell soils formed under stands of mixed hardwoods in moderately deep silty loess over acid sandy outwash.

In a representative profile the surface layer is 8 inches of dark grayish-brown silt loam, and the subsurface layer is about 4 inches of brown silt loam. The subsoil, about 22 inches thick, is dark yellowish-brown silt loam in the upper 6 inches and brown silty clay loam underlain by brown loam below. The substratum is yellowish-brown sand.

Available water capacity is moderate in these soils, and natural fertility is high. Permeability is moderate.

Tell soils are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. These soils also are suited to pasture, woodland, and wildlife habitat. Contour stripcropping, diversions, terraces, and grassed waterways help to control erosion. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure are other helpful practices.

Representative profile of Tell silt loam, 0 to 2 percent slopes, in a cultivated field (NE¼NW¼ sec. 14, T. 1 N., R. 9 E.):

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine, subangular blocky structure; friable; neutral; abrupt, smooth boundary.

A2—8 to 12 inches, brown (10YR 5/3) silt loam; weak, thin, platy structure; friable; medium acid; abrupt, smooth boundary.

B1—12 to 18 inches, dark yellowish-brown (10YR 4/4) heavy silt loam; moderate, medium, subangular blocky structure; firm; strongly acid; clear, wavy boundary.

B21t—18 to 30 inches, brown (10YR 4/3) silty clay loam; moderate, medium, subangular blocky structure; firm; thin, discontinuous, dark-brown (10YR 3/3) clay films; strongly acid; clear, wavy boundary.

IIB22t—30 to 34 inches, brown (10YR 4/3) loam; moderate, medium, subangular blocky structure; firm; thin, discontinuous, dark yellowish-brown (10YR 4/4) clay films; medium acid; clear, wavy boundary.

IIC—34 to 60 inches, yellowish-brown (10YR 5/6) sand; single grained; loose; medium acid.

The mantle of silt ranges from 20 to 34 inches in thickness. The Ap horizon ranges in color from dark gray (10YR 4/1) to brown (10YR 4/3). In places the A2 horizon has been mixed with the Ap horizon by plowing. The IIB22t horizon is 2 to 8 inches of loam or sandy loam that formed in underlying sandy outwash. Reaction of this outwash ranges from pH 4.8 to 6.2. The solum ranges from 24 to 36 inches in thickness.

Tell soils are beside areas of Fayette silt loam, benches, and above areas of Dells soils. In Tell soils the lower part of the subsoil formed in acid outwash, but in Fayette, benches, soils the lower part of the subsoil formed in silts. Tell soils are thinner to loose sands than Dells soils.

Tell silt loam, 0 to 2 percent slopes (TcA).—This soil has the profile described as representative of the series. It is on benches in irregularly shaped areas of 40 to 120 acres. The surface layer is almost uniformly dark grayish brown, but in a few concave areas the color is darker.

Included with this soil in mapping are small areas of Fayette silt loam, benches, that have high available water capacity and high natural fertility. Also included in places are small areas of Dells soils.

This soil is suited to all crops commonly grown in the county. Use is limited by the moderate available water capacity. Major management concerns are conserving moisture, maintaining the content of organic matter, maintaining tilth, and improving fertility. Capability unit IIs–1; woodland group 1; wildlife group 1.

Tell silt loam, 2 to 6 percent slopes, eroded (TcB2).—This soil is on benches in valleys in areas of 15 to 165 acres. Slopes are smooth and convex, and they are 150 to 200 feet long.

This Tell soil is slightly shallower to sand, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are small areas of Fayette silt loam, benches, and small areas where slopes are 6 to 8 percent.

If this soil is well managed, it is suited to all crops commonly grown in the county. Practices that control erosion are useful because of slope and the consequent reduced infiltration rate. Other helpful practices are those that maintain or improve tilth and fertility and those that maintain or increase the content of organic matter. Also, because of the limited water capacity, practices are needed that help to conserve much of the rain that falls. Capability unit IIe–2; woodland group 1; wildlife group 1.

Tell silt loam, 6 to 12 percent slopes, eroded (TcC2).—This soil is on the middle or lower parts of hillsides on benches. Areas are narrow and 20 to 65 acres in size. The surface layer is brown. Slopes are smooth and convex, and they are 100 to 175 feet long. A few narrow drainageways cross the areas.

This soil is slightly thinner over sand, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are areas of Meridian soils that lack a mantle of silt.

If this soil is well managed, it is suited to all crops commonly grown in the county. Slope and moderate available water capacity are serious limitations to use. Practices that conserve moisture and control erosion are needed because of the moderate available water capacity, severe hazard of further erosion, and moderate depth to sand. Capability unit IIIe–2; woodland group 1; wildlife group 1.

Terrace Escarpments

Terrace escarpments (Te) consists of small areas in strips on breaks between terraces of two different levels. In most areas the surface layer and subsoil are medium to coarse textured. Texture of the surface layer ranges from silt loam to fine sand. Slopes are 12 to 30 percent.

Available water capacity and natural fertility are moderate to low. The hazard of erosion is severe.

Areas of this land type generally are not suited to crops because of slope, and most areas are used for pasture. In general, soil in this land type is better suited to pasture, wildlife habitat, or trees than to other uses. Growth of forage crops in pastures is fair to good if erosion is controlled and overgrazing does not occur. Areas where slopes are not too steep for farm machinery can be renovated for use as improved pasture. Forage crops grow well in these renovated areas. Protection from fire and

overgrazing are needed in wooded areas. Trees grow well on slopes that face north and on slopes that face east, but tree growth is only fair on slopes that face south and west. Capability unit VIs–3; woodland group 3; wildlife group 1.

Thackery Series

Thackery soils are deep, somewhat poorly drained soils on low benches in valleys. Ground water is at a depth of 1 to 3 feet in these soils in wet periods.

These soils formed under stands of mixed hardwoods in thin silty loess and thick loamy outwash. Below the loamy subsoil is calcareous sand over gravel outwash.

In a representative profile the surface layer is 5 inches of very dark brown silt loam, and the subsurface layer is about 4 inches of dark grayish-brown silt loam. The subsoil, about 39 inches thick, is yellowish-brown silty clay loam over light yellowish-brown and pale-brown sandy clay loam in the upper part and yellowish-brown sandy loam over brown heavy loam in the lower part. The underlying calcareous sand and gravel is light olive gray.

Available water capacity and natural fertility are moderate in Thackery soils. Permeability is moderate.

If these soils are adequately drained, they are suited to all crops commonly grown in the county. Crops, especially alfalfa, do not grow well in undrained areas. All areas are suited to woodland, pasture, and wildlife habitat. In places the root zone is restricted by a water table that fluctuates between depths of 1 and 3 feet. Flooding occurs in places during periods of prolonged rainfall, and water ponds in depressions at these times. Tile drains and open ditches provide adequate drainage where suitable outlets are available. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure are other helpful practices.

Representative profile of Thackery silt loam, 0 to 3 percent slopes, at an undisturbed site (NW¼SE¼ sec. 1, T. 4 N., R. 8 E.):

A1—0 to 5 inches, very dark brown (10YR 2/2) silt loam; moderate, medium, granular structure; very friable; strongly acid; abrupt, wavy boundary.

A2—5 to 9 inches, dark grayish-brown (10YR 4/2) silt loam; weak, thin, platy structure; friable; very strongly acid; abrupt, wavy boundary.

B1—9 to 16 inches, yellowish-brown (10YR 5/4) silty clay loam; few, fine, distinct, strong-brown (7.5YR 5/6) mottles; moderate, medium, subangular blocky structure; firm; very strongly acid; clear, wavy boundary.

B21t—16 to 24 inches, light yellowish-brown (10YR 6/4) light sandy clay loam; many, coarse, distinct, grayish-brown (10YR 5/2) and common, fine, prominent, strong-brown (7.5YR 5/8) mottles; moderate, medium, subangular blocky structure; firm; thin, discontinuous, dark yellowish-brown (10YR 4/4) clay films; very strongly acid; clear, wavy boundary.

B22t—24 to 30 inches, pale-brown (10YR 6/3) sandy clay loam; many, coarse, faint, grayish-brown (10YR 5/2) and common, fine, prominent, strong-brown (7.5YR 5/8) mottles; moderate, medium, subangular blocky structure; firm; thin, discontinuous, brown (10YR 4/3) clay films; very strongly acid; clear, wavy boundary.

B23t—30 to 34 inches, yellowish-brown (10YR 5/6) heavy sandy loam; many, medium, prominent, light-gray (10YR 7/2) mottles; weak, medium, subangular blocky structure; very friable; thin, discontinuous, brown (10YR 4/3) clay films; extremely acid; clear, wavy boundary.

B31—34 to 44 inches, yellowish-brown (10YR 5/8) sandy loam; many, medium, prominent mottles of light gray (10YR 7/2); weak, medium, subangular blocky structure; friable; slightly acid; clear, wavy boundary.

IIB32(beta)—44 to 48 inches, brown (7.5YR 5/2) heavy loam; common pebbles; weak, medium, subangular blocky structure; firm; neutral; abrupt, wavy boundary.

IIC—48 to 60 inches, light olive-gray (5Y 6/2) sand and gravel; single grained; loose, moderately alkaline; effervescent.

The A1 horizon is dark gray (10YR 4/1), very dark brown (10YR 2/2), or dark grayish brown (10YR 4/2) in color. In places the A2 horizon has been plowed into the Ap horizon. In areas where the mantle of silt is 10 to 18 inches thick, texture is silt loam or silty clay loam. The B2t horizon is sandy clay loam or finer textured material, and it is always more than 10 inches thick. Calcareous sand and gravel outwash ranges from 40 to 60 inches or more in depth.

Thackery soils are below well-drained Ockley soils and above poorly drained Sebewa soils. They are more poorly drained than Ockley soils, and they have a thicker solum than Sebewa soils. Thackery soils are better drained than Sebewa soils, and they lack the thick black surface layer of those soils.

Thackery silt loam, 0 to 3 percent slopes (ThA).—This is the only Thackery soil mapped in the county. It is on low benches in long, narrow areas of 20 to 65 acres. In cultivated areas the plow layer is almost uniformly dark grayish brown, but in a few areas where slopes are concave, the color is darker.

Included with this soil in mapping are small areas of Sebewa soils in depressions. Water collects in these areas. Also included are a few areas where the soil has a mantle of silt 18 to 36 inches thick and areas where the surface layer is loam.

If this soil is adequately drained and otherwise well managed, it is well suited to row crops, small grains, and hay. Wetness is the major limitation to use. In places the hazard of erosion is moderate. Management concerns are removing excess water, improving tilth, increasing the rate of permeability, and maintaining the content of organic matter. Careful timing of tillage is an important aid in preventing puddling in the plow layer. Excess water can be removed by ditches and tile drains. Capability unit IIw–2; woodland group 7; wildlife group 5a.

Wallkill Series

The Wallkill series consists of deep, poorly drained soils on low benches and bottoms in valleys. Ground water is at or near the surface of these soils throughout the year. Wallkill soils formed in moderately deep silty alluvium over thick deposits of peat and muck. Overflow from nearby streams continually adds soil material to these soils.

In a representative profile, the upper 24 inches is dark-gray and dark grayish-brown silt loam. Below this is black muck.

Available water capacity is high in Wallkill soils, and natural fertility and permeability are moderate. Because of the organic part of these soils, they are severely limited in use for almost all kinds of construction.

If these soils are adequately drained, they are suited to row crops, small grains, and hay. Undrained areas,

however, are better suited to pasture, woodland, and wildlife habitat. Control of seepage, overflow, and the high water table are needed for maximum growth of crops. Open ditches or tile drains can be used to remove excess water and lower the water table. Using dikes and straightening stream channels helps to prevent flooding.

Once these soils are drained, practices that maintain the content of organic matter and maintain tilth of the surface layer and permeability of the subsoil are needed. Other helpful practices are keeping tillage to a minimum, using cropping systems and cover crops, plowing down green manure crops, and returning crop residue to the soil.

Representative profile of Wallkill silt loam in a cultivated field (SW¼NW¼ sec. 19, T. 3 N., R. 6 E.):

Ap—0 to 5 inches, dark-gray (10YR 4/1) silt loam; moderate, fine, granular structure; friable; neutral; clear, wavy boundary.

A12—5 to 13 inches, dark grayish-brown (10YR 4/2) silt loam; common, fine, distinct, dark-brown (7.5YR 4/4) mottles; weak, fine, subangular blocky structure; friable; neutral; clear, wavy boundary.

A13—13 to 24 inches, dark-gray (5Y 4/1) silt loam; common, fine, distinct, dark-brown (7.5YR 4/4) mottles; massive to weak, thin, platy structure; friable; neutral; abrupt, wavy boundary.

IIOa1—24 to 60 inches, black (10YR 2/1) muck; weak, coarse, platy structure; friable; neutral.

The A horizon ranges from 20 to 40 inches in thickness. In this horizon color ranges from dark gray (10YR 4/1) to olive gray (5Y 4/2). The underlying organic soil is black (10YR 2/1) to very dark grayish-brown (10YR 3/2) muck or mucky peat that is blocky, platy, or matted. Less than 15 percent of the sand in the control section of these Wallkill soils is coarser than very fine sand.

Wallkill soils are in low areas beside Orion, wet variant, and Otter soils. The Wallkill soils are underlain by organic soil, but the Orion, wet variant, and Otter soils are underlain by black mineral soil.

Wallkill silt loam (0 to 2 percent slopes) (Wa).—This is the only Wallkill soil mapped in the county. It is on low benches and bottoms in areas of 10 to 45 acres that are irregular in shape. The surface layer is almost uniformly dark gray, but in a few areas the color is darker. Water ponds on this soil after flooding.

Included with this soil in mapping are a few small areas of Orion, wet variant, soils and a few areas where the silty part of the soil is more than 40 inches thick. Also included in places are areas where mineral soil is below the organic soil at a depth of 48 to 60 inches.

If this soil is adequately drained, it is suited to all crops commonly grown in the county. Undrained areas are better suited to pasture, woodland, and wildlife habitat than to other uses. Major management concerns are providing adequate internal and surface drainage, preventing flooding, increasing the content of organic matter, and improving tilth. Capability unit IIw-13; woodland group 9; wildlife group 5b.

Westville Series

Westville soils are deep, well-drained soils on glaciated uplands and high benches in valleys. Ground water is at a depth of more than 5 feet in these soils throughout the year. Westville soils formed under stands of mixed hardwoods in very thin loess over deeply weathered loamy glacial till.

In a representative profile, the surface layer is 4 inches of very dark gray silt loam, and the subsurface layer is about 6 inches of brown silt loam. The subsoil, about 58 inches thick, is brown silty clay loam over light clay loam in the upper 14 inches and strong-brown clay loam underlain by strong-brown loam below. The substratum is yellow-brown, calcareous sandy loam.

Available water capacity is high in these soils, and natural fertility and permeability are moderate.

Westville soils are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. These soils also are suited to pasture, woodland, and wildlife habitat. In cultivated areas, contour stripcropping, diversions, terraces, and grassed waterways help to control erosion. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure are other helpful practices.

An undisturbed profile within an area of Westville silt loam, 2 to 6 percent slopes, eroded, (SE¼NE¼ sec. 30, T. 1 N., R. 9 E.):

A1—0 to 4 inches, very dark gray (10YR 3/1) silt loam; moderate, fine, granular structure; very friable; many roots; neutral; abrupt, wavy boundary.

A2—4 to 10 inches, brown (10YR 5/3) silt loam; moderate, thin, platy structure; friable; strongly acid; abrupt, wavy boundary.

B1—10 to 14 inches, brown (10YR 4/3) light silty clay loam; weak, very fine, subangular blocky structure; firm; slightly acid; gradual, smooth boundary.

IIB21t—14 to 24 inches, dark-brown (7.5YR 4/4) light clay loam; moderate, fine, subangular blocky structure; firm; thin, discontinuous, dark-brown (7.5YR 3/2) clay films; strongly acid; clear, smooth boundary.

IIB22t—24 to 38 inches, strong-brown (7.5YR 5/6) clay loam; weak, medium, angular blocky breaking to moderate, fine, subangular blocky structure; very firm; thin, patchy, dark reddish-brown (5YR 3/2) clay films on all ped faces; strongly acid; gradual, wavy boundary.

IIB23t—38 to 55 inches, strong-brown (7.5YR 5/6) light clay loam; weak, fine, subangular blocky structure; firm; thin, patchy, dark reddish-brown (5YR 3/2) clay films on all ped faces; strongly acid; clear, wavy boundary.

IIB3—55 to 68 inches, strong-brown (7.5YR 5/6) heavy loam; weak, fine, subangular blocky structure; firm; medium acid; clear, wavy boundary.

IIC—68 to 80 inches, yellowish-brown (10YR 5/4) sandy loam; weak, medium, platy structure; friable; moderately alkaline; effervescent.

The mantle of silt has a maximum thickness of 15 inches. The Ap horizon ranges from 6 to 8 inches in thickness and from dark grayish-brown (10YR 4/2) to brown (10YR 4/3) in color. In places the A2 horizon has been mixed into the Ap horizon by plowing. The B1 and IIB2t horizons are silty clay loam or clay loam, and the IIB3 horizon is loam or sandy clay loam. Calcareous loam or sandy loam till ranges in depth from 60 to more than 70 inches. In places dolomite bedrock is at a depth of 48 to 60 inches.

Westville soils are beside and below areas of Pecatonica and Winnebago soils. Their surface layer is lighter colored than that of Winnebago soils. Less of the subsoil in Westville soils formed in loess than the subsoil in Pecatonica soils.

Westville loam, 6 to 12 percent slopes, eroded (WdC2).—This soil is in narrow areas of 40 to 150 acres that are mostly uniform in shape. Slopes are slightly convex and 125 to 200 feet long. The plow layer in cultivated areas is dark grayish brown and 6 to 8 inches thick, but in a few places this layer is very dark grayish brown or dark brown. A few narrow drainageways cut the areas.

Except for the 6- to 8-inch dark grayish-brown plow layer of loam in most cultivated areas, the profile of this soil is similar to that of the soil described for the series.

Included with this soil in mapping are small areas of Miami silt loam. Also included are areas where the surface layer is silt loam or sandy loam.

If this soil is managed properly, it is suited to all crops commonly grown in the county. The severe hazard of further erosion limits use. Major management concerns are controlling erosion, increasing the content of organic matter, and improving tilth and fertility. Capability unit IIIe–1; woodland group 1; wildlife group 1.

Westville silt loam, 2 to 6 percent slopes, eroded (WeB2).—This soil has the profile described for the series. It is on ridgetops and the upper parts of long narrow areas, 85 to 265 acres in size. The plow layer is almost uniformly dark grayish brown, but in a few areas the color is very dark grayish brown. Slopes are 150 to 250 feet long.

Included with this soil in mapping are small areas of Pecatonica silt loam and areas where the soil is moderately well drained. Also included in places are small areas where the surface layer is loam or sandy loam, and areas of soil similar to this Westville soil except that it is uneroded. Tilth is better and the content of organic matter is higher in areas where the soil is not eroded.

If this soil is managed properly, growth of all crops common to the county is good. The moderate hazard of further erosion limits use. Major management concerns are increasing the content of organic matter, improving tilth and fertility, and controlling erosion. Capability unit IIe–1; woodland group 1; wildlife group 1.

Westville silt loam, 6 to 12 percent slopes, eroded (WeC2).—This soil is on slightly convex hillsides in narrow areas of 60 to 125 acres that are mostly uniform in shape. In cultivated areas the plow layer generally is dark grayish brown and 6 to 8 inches thick, but in a few areas this layer is very dark grayish brown or dark brown. Slopes are 100 to 150 feet long. A few narrow drainageways cross the areas.

Except for the 6- to 8-inch dark grayish-brown plow layer in most cultivated areas and the slightly thinner solum, the profile of this soil is similar to that described for the series.

Included with this soil in mapping are small areas of Pecatonica silt loam. Also included are areas where the surface layer is loam or sandy loam.

If this soil is managed properly, it is suited to all crops commonly grown in the county. The severe hazard of further erosion limits use. Major management concerns are controlling erosion, increasing the content of organic matter, and improving tilth and fertility. Capability unit IIIe–1; woodland group 1; wildlife group 1.

Westville silt loam, 12 to 20 percent slopes, eroded (WeD2).—This soil is on slightly convex hillsides in narrow areas of 20 to 90 acres that are mostly uniform in shape. In cultivated areas the plow layer is dark grayish brown and 6 to 8 inches thick, but in a few areas this layer is very dark grayish brown or dark brown. Slopes are 100 to 150 feet long. A few narrow drainageways cross the areas.

Except for the 6- to 8-inch dark grayish-brown plow layer in most cultivated areas and the thinner solum, the profile of this soil is similar to that described for the series.

Included with this soil in mapping are small areas where the surface layer is sandy loam or loam. Also included are areas where slope is slightly more than 20 percent.

Under good management this soil is suited to all crops commonly grown in the county and to the development of wildlife habitat. Many areas are wooded or in pasture. This soil has good potential for many different kinds of timber, and it is especially well suited to walnut and oak trees. Slopes that face south and southwest have less potential for timber than those that face other directions. The hazard of further erosion is very severe. Capability unit IVe–1; woodland group 1; wildlife group 1.

Whalan Series

The Whalan series consists of moderately deep, well-drained soils that are underlain by dolomite. Ground water is at a depth of more than 5 feet in these soils throughout the year. Whalen soils formed in thin loess over glacial till underlain by clayey material weathered from dolomite bedrock. The natural vegetation was mixed hardwoods.

In a representative profile, the surface layer is about 5 inches of very dark gray silt loam, and the subsurface layer is 5 inches of dark grayish-brown silt loam. The subsoil, about 23 inches thick, is 5 inches of brown silty clay loam in the upper part and dark-brown clay loam over reddish-brown clay below. The underlying dolomite bedrock is fractured, and the cracks are filled with soil material.

Available water capacity, natural fertility, and permeability are moderate in Whalan soils.

If Whalan soils are properly managed, they are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. These soils also are suited to pasture, woodland, and wildlife habitat. Practices that help to control erosion and conserve moisture are needed in cultivated areas. Use of contour stripcripping, diversions, terraces, and grassed waterways helps to control erosion. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure are other helpful practices.

An undisturbed profile within an area of Whalan silt loam, 2 to 6 percent slopes, eroded (SW¼NW¼ sec. 32, T. 1 N., R. 8 E.):

A1—0 to 5 inches, very dark gray (10YR 3/1) silt loam; moderate, medium, subangular blocky structure; friable; neutral; clear, wavy boundary.

A2—5 to 10 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, medium, platy structure; friable; many roots; slightly acid; clear, wavy boundary.

B1—10 to 15 inches, brown (10YR 4/3) silty clay loam; moderate, fine, subangular blocky structure; firm; slightly acid; clear, wavy boundary.

IIB21t—15 to 28 inches, dark-brown (7.5YR 4/4) clay loam; moderate, very fine, angular blocky structure; firm; thin, discontinuous. dark-brown (7.5YR 3/2) clay films; medium acid; clear, wavy boundary.

IIB22t—28 to 33 inches, reddish-brown (5YR 4/4) clay; moderate, very fine, angular blocky structure; firm; thin, continuous, dark reddish-brown (5YR 3/3) clay films; slightly acid; abrupt, wavy boundary.

IIR—33 to 60 inches, pale-brown (10YR 6/3) dolomite bedrock.

Maximum thickness of the silt mantle is 18 inches. The Ap horizon ranges from 6 to 8 inches in thickness and from

dark grayish brown (10YR 4/2) to brown (10YR 4/3) in color. In places the A2 horizon has been mixed with the Ap horizon by plowing. The B2t horizon ranges from sandy clay loam to clay loam in texture, from dark yellowish brown (10YR 4/4) to dark brown (7.5YR 4/4) in color, and from 5 to 20 inches in thickness. The lower part of the B2t horizon is clayey residuum from dolomite that lies between the weathered till and the dolomite bedrock. In places the B2t horizon is missing. The fractured dolomite ranges in depth from 20 to 35 inches.

Whalan, Dunbarton, NewGlarus, Rockton, and Arland, warm variant, soils all are underlain by bedrock at a depth of less than 40 inches. Whalan soils are deeper to dolomite bedrock than Dunbarton soils. They formed in loamy till and clayey residuum, unlike NewGlarus soils, which formed in loess and clayey residuum. Whalan soils are underlain by dolomite, unlike Arland, warm variant, soils, which are underlain by sandstone. They have a thinner and lighter colored surface layer than Rockton soils.

Whalan loam, 2 to 6 percent slopes, eroded (WhB2).—This soil is on uplands on broad ridgetops and the upper parts of hillsides. Areas are 25 to 165 acres in size. Slopes are smooth and convex and are 150 to 200 feet long. In cultivated areas the plow layer is about 7 inches of dark grayish-brown or brown loam, but in a few areas the color is darker.

The surface layer of this soil is loam, but the profile otherwise is similar to that described for the series.

Included with this soil in mapping are small areas of Westville soils. Also included in places are small areas where slope is 6 to 8 percent.

If this soil is managed properly, it is suited to all crops commonly grown in the county. Because of slope and the consequent reduced rate of infiltration, practices are needed that help to control erosion. Also needed, because of limited available water capacity, are practices that help to conserve much of the rain that falls. Other helpful practices are those that maintain or improve tilth and maintain or increase the content of organic matter. Capability unit IIe–2; woodland group 1; wildlife group 1.

Whalan loam, 6 to 12 percent slopes, eroded (WhC2).—This soil is on the middle parts of hillsides in narrow areas of 30 to 100 acres. Slopes are smooth and convex and are 100 to 175 feet long. A few narrow drainageways cut the areas. In cultivated areas the plow layer is dark grayish-brown loam, but in a few areas the color of this layer is darker.

This soil is slightly thinner over bedrock, and it has an 8-inch surface layer of brown loam, but the profile otherwise is similar to that described for the series. Included in mapping are areas of Dunbarton soils.

If this soil is managed properly, it is suited to all crops commonly grown in the county. Slope and limited available water capacity limit use. Erosion needs to be controlled and moisture needs to be conserved because of the limited available water capacity, severe hazard of further erosion, and limited depth to bedrock. Capability unit IIIe–2; woodland group 1; wildlife group 1.

Whalan silt loam, 2 to 6 percent slopes, eroded (WlB2).—This soil has the profile described for the series. It is on broad ridgetops and the upper part of hillsides in areas of 75 to 185 acres. Slopes are smooth and convex and are 150 to 200 feet long. In cultivated areas the plow layer is dark grayish brown.

Included with this soil in mapping are small areas of Westville soils. Also included in places are small areas where slopes are 6 to 8 percent.

If this soil is managed properly, it is suited to all crops commonly grown in the county. Because of slope and the consequent reduced rate of infiltration, practices are needed that help to control erosion. Also needed, because of the limited available water capacity, are practices that help to conserve much of the rain that falls. Other helpful practices are those that maintain or improve tilth and maintain or increase the content of organic matter. Capability unit IIe–2; woodland group 1; wildlife group 1.

Whalan silt loam, 6 to 12 percent slopes, eroded (WlC2).—This soil is on the middle parts of hillsides in narrow areas of 40 to 100 acres. Slopes are smooth and convex and are 100 to 175 feet long. A few narrow drainageways cross the areas. In cultivated areas the plow layer is brown, but in a few areas the color of this layer is darker. This soil is slightly thinner over bedrock than the soil described as representative of the series.

Included with this soil in mapping are areas of Dunbarton soils that are 10 to 20 inches thick over limestone. Also included are areas of soil similar to this one except that it is uneroded.

If this soil is managed properly, it is suited to all crops commonly grown in the county. Slope and moderate available water capacity limit use. Because of the limited available water capacity, severe hazard of further erosion, and limited depth to bedrock, practices are needed that help to conserve moisture and control erosion. Capability unit IIIe–2; woodland group 1; wildlife group 1.

Whalan silt loam, 12 to 20 percent slopes, eroded (WlD2).—This soil is on the lower parts of slopes in narrow areas of 20 to 95 acres. The surface layer is brown. In places topsoil from higher areas has accumulated at the bases of slopes. Drainageways commonly cross the areas. Slopes are 50 to 100 feet long.

This soil is thinner to dolomite bedrock, but the profile otherwise is similar to that described for the series.

Included with this soil in mapping are small areas of Dunbarton soils and areas where the surface layer is loam. Also included, at the bases of slopes and in drainageways, are areas of Chaseburg soils.

This soil is better suited to small grains, forage crops, pasture, and wildlife habitat than to other uses. Serious concerns in management are slope, the very severe hazard of further erosion, and the limited thickness over bedrock. In cultivatd areas practices are needed that help to control erosion, conserve moisture, improve tilth and fertility, and increase the content of organic matter. Capability unit IVe–2; woodland group 1; wildlife group 1.

Winnebago Series

Winnebago soils are deep, well-drained soils on glaciated uplands and high benches in the glaciated part of the county. Ground water is at a depth of more than 5 feet throughout the year. Winnebago soils formed under prairie grass in thin loess and deep loamy glacial till.

In a representative profile the upper 13 inches is black and dark-brown silt loam. The subsoil, about 50 inches thick, is dark-brown and strong-brown clay loam in the upper 41 inches and yellowish-brown sandy clay loam in the lower 9 inches. The underlying sandy loam calcareous till is light yellowish brown.

Natural fertility and available water capacity are high in these soils. Permeability is moderate.

Winnebago soils are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. These soils also are suited to pasture and wildlife habitat. In cultivated areas, contour stripcropping, diversions, terraces, and grassed waterways help to control erosion. Keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure are other helpful practices.

Representative profile of Winnebago silt loam, 2 to 6 percent slopes, eroded, in a cultivated field (SW¼NE¼ sec. 15, T. 1 N., R. 7 E.):

Ap—0 to 8 inches, black (10YR 2/1) silt loam; moderate, fine, granular structure; very friable; neutral; clear, smooth boundary.

A3—8 to 13 inches, dark-brown (10YR 3/3) silt loam; moderate, fine, granular structure; very friable; slightly acid; clear, smooth boundary.

B21t—13 to 28 inches, dark-brown (7.5YR 4/4) heavy clay loam; moderate, fine, subangular blocky structure; very firm; thin, patchy, dark-brown (7.5YR 3/2) clay films on horizontal and vertical ped faces; medium acid; gradual, wavy boundary.

B22t—28 to 44 inches, strong-brown (7.5YR 5/6) clay loam; moderate, very fine, subangular blocky structure; very firm; thin, discontinuous, dark-brown (7.5YR 4/4) clay films; medium acid; gradual, wavy boundary.

B23t—44 to 54 inches, strong-brown (7.5YR 5/6) clay loam; moderate, fine, angular blocky structure; very firm; thin, discontinuous, dark reddish-brown (5YR 3/2) clay films; medium acid; clear, wavy boundary.

B3—54 to 63 inches, yellowish-brown (10YR 5/6) sandy clay loam; weak, medium, subangular blocky structure; very firm; few patchy clay films on vertical ped faces only; mildly alkaline; clear, wavy boundary.

C—63 to 70 inches, light yellowish-brown (10YR 6/4) heavy sandy loam; massive; firm; moderately alkaline; strongly effervescent.

Maximum thickness of the loess is 15 inches. The surface layer ranges in color from black (10YR 2/1) to dark brown (10YR 3/3). The subsoil is loam, sandy clay loam, or clay loam. Calcareous loam or sandy loam glacial till generally ranges in depth from 50 to 75 inches but in places is at a depth of about 90 inches. In places dolomite is at a depth of 48 to 60 inches.

Winnebago soils are near areas of Durand, Griswold, and Westville soils. Their silt mantle is thinner than that of Durand soils, and they are deeper to calcareous till than Griswold soils. Winnebago soils have a thicker, darker colored surface layer than Westville soils.

Winnebago silt loam, 2 to 6 percent slopes, eroded (WnB2).—This soil has the profile described as representative of the series. It is on glaciated ridges and the upper parts of hillsides in long, narrow areas of 75 to 260 acres. In cultivated areas the plow layer is almost uniformly black, but in a few areas the color is very dark grayish brown. Slopes are 150 to 250 feet long.

Included with this soil in mapping are small areas of Durand silt loam and areas where the soil is moderately well drained. Also included are areas of soil similar to this Winnebago soil except that it is uneroded. Tilth of the soil is better in these areas, and the content of organic matter is higher than in Winnebago silt loam, 2 to 6 percent slopes, eroded.

If this Winnebago soil is managed properly, it is well suited to all crops commonly grown in the county. The moderate hazard of further erosion is the only limitation to use. Major management concerns are increasing the content of organic matter, improving tilth and fertility, and controlling erosion. Capability unit IIe-1; woodland group 12; wildlife group 4.

Winnebago silt loam, 6 to 12 percent slopes, eroded (WnC2).—This soil is in narrow areas of 60 to 140 acres that are mostly uniform in shape. A few narrow drainageways commonly cross the areas. In cultivated areas the surface layer generally is very dark brown and is 6 to 8 inches thick, but except for the color of the surface layer the profile of the soil in these areas is similar to that described as representative of the series. In a few areas the surface layer is dark grayish brown or dark brown. Included in mapping are small areas of Griswold silt loam.

If this soil is well managed, it is suited to all crops commonly grown in the county. A severe hazard of further erosion is the only limitation to use. The chief management concerns are controlling erosion, increasing the content of organic matter, and improving tilth and fertility. Capability unit IIIe-1; woodland group 12; wildlife group 4.

Use and Management of the Soils

This section first explains the system of capability classification used by the Soil Conservation Service and the basic management practices that apply to all of the soils. Next, management of the soils by capability units is described and estimated yields of principal crops are given. Finally, management of the soils for woodland, for wildlife, and for engineering uses is discussed.

Basic Practices of Management

In this subsection, management practices suitable for all soils in the county are briefly described. In addition to these general practices, however, the farmer will need to know the kinds of soil on his particular farm and to take into account the livestock, machinery, and equipment he owns, the labor and capital at his disposal, and other available resources.

Most soils in the county need practices that help control erosion. Consequently, the farmer needs to know the kinds of crops to grow to protect his soils and the kinds of practices, such as terracing, stripcropping (fig. 6), grassed waterways, or tilling on the contour, that will suit his soil conditions. Soil surveys will help him determine whether to use his soils for crops or whether they should be kept under a protective cover of grass or trees.

To avoid repetition, the practices that apply to all soils suitable for crops, pasture, trees, or wildlife are summarized and should be considered with the practices suggested for each capability unit.

If soils are used for cultivated crops, certain practices will maintain or improve their natural fertility, protect them from erosion, and keep them in good tilth.

Fertility management.—Some of the soils in this county do not have sufficient available phosphorous or potassium to produce acceptable yields of crops. Soils that have only moderate amounts of phosphorous and potassium are those of the Brookston, Dakota, Dodgeville, Downs, Ettrick, and Tama series.

Other soils contain relatively high amounts of available phosphorous but only moderate amounts of potassium. Some of these soils are those of the Chaseburg, Fayette, Gale, Hixton, Miami, NewGlarus, and

Figure 6.—**Field in which areas of corn have been alternated with strips of close-growing crops to control erosion.**

Pecatonica series. Applications of fertilizer according to needs indicated by soil test will provide sufficient fertility for good crop growth. The local county agent or Soil Conservation Service technician can provide information about taking soil samples and about applying fertilizer and lime.

The soils most likely to be deficient in nitrogen are the eroded soils on uplands, the sandy soils, and the soils that have been continuously planted to corn. Especially in years of above-average rainfall, the application of nitrogenous fertilizers can improve the growth of most crops. Growing legumes frequently in the cropping system will supply a part of the nitrogen needed by other crops.

Such deep-rooted crops as alfalfa may be used in the cropping sequence to improve soil structure, to increase moisture penetration, and to add organic matter and nitrogen. Alfalfa-bromegrass mixtures are generally grown for hay; but if the forage is used for pasture or if the crop is cut for hay three times during the year, orchardgrass can be substituted for bromegrass. Ladino clover can also be added to the pasture mixture. Although hay may be sold or used on the farm, it is usually more profitable as part of a livestock enterprise than as a cash crop.

Most of the soils in Green County are deficient in lime. Lime applied prior to the planting of corn in a corn-oats-hay sequence will generally have sufficient time to raise the reaction (pH) to a range suitable for legumes.

To obtain the most value from manure, all available manure is applied to the soil in the following order: areas in corn, areas in oats if lodging is not a problem, and areas in grass sod. Manure is especially valuable in establishing grass in waterways and in areas of eroded soils. Besides supplying nutrients, manure acts as a mulch and will improve fertility and tilth, help maintain structure, and keep the soil porous and permeable.

Erosion control.—Water erosion and soil blowing are serious concerns in many places in Green County. The loss of any surface soil reduces the supply of organic matter and plant nutrients. It also makes the soil less absorbent so that more water runs off, the rate of erosion increases, and the supply of available water is less than in an uneroded soil.

Water may cause either sheet or gully erosion. The degree of water erosion depends on the length and the steepness of the slopes; the texture, structure, and permeability of the soil; and the vegetation on the soil.

Practices that will control water erosion include (1) terracing, if slope does not exceed 12 percent; (2) establishing suitable grasses in waterways and outlets; (3) protecting erodible sites by diverting runoff water from higher areas; (4) tilling and planting on the contour or parallel to terraces; (5) utilizing crop residue; and (6) installing dams, grade stabilization structures, or other needed structures.

The damage done by soil blowing is easily recognized on some sandy soils. The degree of damage is determined by the erodibility of the soil, the smoothness of the soil surface (rough surfaces resist erosion), the wind velocity and surface moisture, the length of a field unprotected by natural wind barriers or planted shelterbelts, and the kind and quantity of vegetative cover on the soil surface. Soils in fields facing the wind become more subject to blowing as slope increases up to 10 percent. A growing crop or such crop residues as cornstalks kept on the soil at all times helps control soil blowing. If soil blowing starts on an unprotected field, emergency tillage to roughen the surface may be necessary to hold the soil until a crop can be established.

Tillage practices.—The main purposes of tillage are to prepare a seedbed, to prepare a root bed, and to eliminate competing vegetation. Frequent tillage destroys the structure of the soil by producing a powdery surface layer which will not absorb water readily and which is easily blown by wind. It also reduces the content of organic matter. Ordinarily tillage is needed only to prepare a good seedbed and to control weeds and volunteer growth. If chemicals are used to control weeds, the soil may be tilled less frequently.

Minimum tillage methods, which include plow planting and wheel-track planting, can be used on sloping land or on flat land which is plowed in spring. Such methods reduce labor and tillage costs and also reduce the amount of soil compaction, because fewer trips over the field are required. More rainfall, trapped in the rough soil surface, is available for crop use. Keeping tillage to a minimum also helps control the growth of weeds.

More than 50,000 acres in Green County are used for pasture. Pasture growth in many areas of the steeper soils in the county can be improved by a program of renovation and good management. The area selected for renovation should be large enough to be handled as a definite part of the pasture program, and the soil should be good enough to justify the cost of applying lime and fertilizer, tilling, reseeding, and removing obstructions.

Grazing management is important whether it is applied to renovated or natural pastures. Overgrazing should be avoided, and the number of livestock in a pasture should be adjusted to the expected forage production. If grazing is delayed in spring until grasses and legumes have made good growth, production will generally be higher for the season. Legume pastures given a rest period from early September until the first killing frost can be highly productive the following year.

Most of the phosphorous needs of a grass-legume pasture can be supplied at the time of renovation, but

additional potassium will have to be furnished by top-dressing with complete fertilizer or potassium fertilizer. No nitrogen will be needed if at least one-third of the grass-legume mixture is legumes; but if the pasture is mainly grass, an application of nitrogen is desirable early in spring.

Pastures free of weeds produce more forage of higher quality. Spraying or mowing weeds and brush before they set seed will improve pasture quality.

Surface and tile drains improve soils that are normally set, but wet soils that cannot be tiled or ditched can be adequately fertilized and planted to crops that tolerate water. Lower areas may be protected from runoff from uplands by means of diversions or waterways or both.

Management by Capability Units

In the following pages the capability units for Green County are described, and use and management of soils in each unit are given. Soils in one capability unit have about the same limitations and similar hazards. Thus, the soils in one unit need about the same kind of management, though they may have formed in different kinds of material and in different ways. The names of soil series represented are mentioned in the description of each capability unit, but this does not mean that all soils of a given series appear in the unit. To find the names of all soils in any given capability unit, refer to the "Guide to Mapping Units" at the back of this survey.

Capability grouping

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The groups are made according to the limitations of the soils when used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops requiring special management.

Those familiar with the capability classification can infer from it much about the behavior of soils when used for other purposes, but this classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for range, for forest trees, or for engineering.

In the capability system, all kinds of soils are grouped at three levels, the capability class, subclass, and unit. These are discussed in the following paragraphs.

CAPABILITY CLASSES, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use, defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants, require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife.

Class VI soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife.

Class VII soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to pasture or range, woodland, or wildlife.

Class VIII soils and landforms have limitations that preclude their use for commercial plants and restrict their use to recreation, wildlife, or water supply, or to esthetic purposes.

CAPABILITY SUBCLASSES are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States but not in Green County, shows that the chief limitation is climate that is too cold or to dry.

In class I there are no subclasses, because the soils of this class have few limitations. Class V can contain, at the most, only the subclasses indicated by *w*, *s*, and *c*, because the soils in class V are subject to little or no erosion, though they have other limitations that restrict their use largely to pasture, range, woodland, wildlife, or recreation.

CAPABILITY UNITS are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-4 or IIIe-6. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation; the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph; and the Arabic numeral specifically identifies the capability unit within each subclass.

In the following pages the capability units in Green County are described, and suggestions for the use and management of the soils are given.

CAPABILITY UNIT I-2

This unit consists only of Chaseburg and Arenzville silt loams. These soils are deep, nearly level, and well drained. They have a medium-textured subsoil. The soils

are in concave areas in valleys, on stream bottoms, and in small drainageways below steep sides of valleys.

These soils are relatively fertile and easy to cultivate. The content of organic matter is high. Available water capacity is high, and permeability is moderate. Ground water is at a depth of more than 3 feet during wet periods.

These soils are well suited to all crops commonly grown in the county. They are suited to grasses and to fast-growing hardwood. The main crops are corn, soybeans, oats, and clover. If good structure is maintained, the soils can be cultivated intensively. Row crops can be grown continuously if all crop residue is returned to the soil, tillage is kept to a minimum, and good tilth and a high level of fertility are maintained. The major requirements of management are control of flooding, maintenance of fertility and content of organic matter, and improvement and maintenance of tilth. Channelling of runoff water also is helpful.

CAPABILITY UNIT I-3

This unit consists of deep, nearly level, well-drained silt loams and loams of the Downs, Fayette, Flagg, Ockley, and Tama series. These soils are on benches in valleys and on glaciated uplands.

The content of organic matter is moderate to high in soils of this unit, and the soils are relatively fertile. Available water capacity is high, and permeability is moderate. Ground water is at a depth of 3 to 5 feet during wet periods.

Soils in this unit are well suited to all crops commonly grown in the county. Corn, soybeans, oats, and alfalfa are the main crops. The soils also are suited to grasses, and soils in this unit that have a light-colored surface layer are suited to stands of fast-growing hardwoods.

The soils in this unit are easily cultivated, and they can be cultivated intensively if good soil structure is maintained. Row crops can be grown continuously if all crop residue is returned to the soil, tillage is kept to a minimum, high fertility is maintained, and the soils are maintained in good tilth. The major management requirements are maintaining the content of organic matter, maintaining fertility, and improving and maintaining tilth. The Tama soils have a higher content of organic matter, are more permeable, and are easier to maintain in good tilth than the other soils in this unit.

CAPABILITY UNIT IIe-1

This unit consists of deep, gently sloping, well-drained loams and silt loams in the Ashdale, Cadiz, Dodge, Downs, Durand, Fayette, Flagg, Griswold, Juda, Miami, Myrtle, Ockley, Ogle, Palsgrove, Pecatonica, Saybrook, Tama, Westville, and Winnebago series. These soils have a thick, moderately fine textured subsoil. They are underlain by loam, loose outwash sand and gravel, or clayey material that weathered from limestone bedrock.

Natural fertility is moderate to high in these soils. Available water capacity is high, and permeability is moderate and moderately slow. Ground water is at a depth of at least 5 feet throughout the year.

Soils in this unit are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. The soils are well suited to pasture, trees, and wildlife habitat, and they will support stands of fast-growing hardwoods.

Soils in this unit respond well to applications of fertilizer and manure. Good tilth is fairly easy to maintain. The Durand, Saybrook, Ogle, Tama, and Winnebago soils are easier to maintain in good tilth than the other soils in this unit. The major management requirements are controlling erosion, maintaining fertility, and maintaining the content of organic matter. If the soils in this unit are cultivated, they are subject to damage by water erosion. Contour stripcropping, diversions, terraces, and grassed waterways help to control erosion. Gullies will not form in the grassed waterways. Runoff from higher slopes can be intercepted by diversions. These and other practices such as keeping tillage to a minimum, returning crop residue to the soil, applying barnyard manure, and applying fertilizer according to soil test will provide for a cropping system that includes more years of row crops and fewer years of meadow.

CAPABILITY UNIT IIe-2

This unit consists of moderately deep, nearly level and gently sloping, well drained and moderately well drained, droughty soils on benches in valleys and on uplands. These soils are in the Arland, warm variant; Dodgeville; Fox; Gale; Hixton; Meridian; NewGlarus; Pillot; Rockton; Sylvester; Tell; and Whalan series. Also in this unit is Dakota loam, 2 to 6 percent slopes, eroded. These soils have a surface layer of silt loam or loam and a medium-textured to moderately fine textured subsoil. The soils are underlain, at a depth of less than 40 inches, by sand over sandstone bedrock, clay over limestone bedrock, loose sand, or sand and gravel.

Natural fertility is moderate to high in soils of this unit. Available water capacity is moderate, and permeability is moderate to moderately slow. Ground water is at a depth of 3 to 5 feet or more throughout the year. The hazard of erosion or further erosion is moderate.

Soils in this unit are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. The soils also are suited to pasture, trees, and wildlife habitat.

The major management requirements are controlling erosion, conserving moisture, maintaining or improving tilth, maintaining or improving fertility, and maintaining or increasing the content of organic matter. Tilth is better in areas of slightly eroded soil than it is in areas of moderately eroded soil. If soils in this unit are cultivated, practices that control erosion and conserve moisture are needed. Contouring, diversions or terraces, and grassed waterways help in the control of erosion. Other needed practices are keeping tillage to a minimum, returning crop residue to the soil, applying fertilizer according to soil test, and applying barnyard manure. Such practices provide for more years of row crops in the cropping system and fewer years of meadow. Suggested practices for woodlots are outlined in the "Woodland" section of this survey.

CAPABILITY UNIT IIe-5

Chaseburg silt loam, 2 to 6 percent slopes, is the only soil in this unit. It is a deep, gently sloping, well-drained

soil that formed in alluvium. This soil is on upland drainageways, on the lower parts of slopes, and on fan-shaped drainageways.

This soil is relatively fertile. Permeability is moderate. Ground water table is at a depth of 3 to 5 feet or more during wet periods, and areas of this soil are subject to frequent flooding for short periods. The hazard of erosion is slight. Because this soil is in areas that collect water, it is subject to gullying.

Most of this soil is suited to all crops commonly grown in the county. The main crops are corn, oats, alfalfa, and bluegrass. The soil also is suited to pasture, trees, and wildlife habitat. Inaccessible areas or areas that are frequently flooded are not suited to crops but are suited to pasture.

This soil is easily cultivated. Crops need protection from runoff (fig. 7). Major management requirements are control of flooding, erosion, and gullying and maintenance of fertility, tilth, and the content of organic matter. Many areas of this soil can be protected by diversions that intercept runoff and channel it into grassed waterways. Sloping, shaping, and seeding of natural waterways is essential. Keeping tillage to a minimum, returning crop residue to the soil, applying fertilizer according to soil test, and using other good management practices will provide for more years of row crops in the cropping system and fewer years of meadow.

Figure 7.—**Concrete structure in drainageway that eliminates gullying in higher field of Chaseburg silt loam, 2 to 6 percent slopes.**

CAPABILITY UNIT IIe-6

This unit consists of deep, gently sloping, well-drained soils on glaciated upland ridges and on benches in old lake basins. These soils are in the Hebron, Morley, and Saylesville series. They have a surface layer of loam and silt loam and a clayey subsoil or substratum.

The content of organic matter is medium to moderately low, and natural fertility is moderate to high in soils of this unit. Available water capacity is high, and permeability is moderately slow. Ground water is at a depth of 3 to 5 feet or more during wet seasons. Runoff is rapid during periods of heavy rainfall.

Soils in this unit are suited to all crops commonly grown in the county. The main crops are corn, oats, alfalfa, and clover. The soils also are suited to pasture, trees, and wildlife habitat.

Soils in this unit are difficult to cultivate, and they generally are poor in tilth. The major management requirements are control of erosion and improvement or maintenance of soil permeability. Keeping tillage to a minimum, applying manure heavily, returning crop residue to the soil, and plowing down green manure crops help to maintain or improve tilth and increase the content of organic matter. Application of lime and fertilizer according to soil test will help to increase fertility. These and other practices, such as terracing, maintaining grassed waterways and diversions, and using contour stripcropping, help to control runoff and reduce erosion. Under a program of intensive management, more years of row crops and fewer years of hay can be used in the cropping system. Management of woodlots is given in the "Woodland" section of this survey.

CAPABILITY UNIT IIw-1

This unit consists of deep, nearly level, poorly drained, medium textured and moderately fine textured soils of the Brookston, Colwood, Ettrick, Navan, Ossian, and Otter series. These soils are on low benches and stream bottoms.

Natural fertility is moderate to high in soils of this unit. Available water capacity is high, and permeability is moderate and moderately slow. Undrained areas are frequently flooded, and small ponds remain long after floodwaters have subsided. Ground water is at or near the surface most of the year.

Areas of soils in this unit that are adequately drained are well suited to all crops commonly grown in the county. Corn, soybeans, and clover are the main crops. Undrained areas are suited to pasture for limited use and are excellently suited to wildlife habitat.

These soils are slow to warm in spring and quick to cool in fall. Major management concerns are lowering the water table, providing surface drainage, controlling flooding, improving tilth, and raising soil temperature. Tile drains and open ditches are needed for drainage in cultivated areas. The tile drains are unsuitable in areas where the surface layer is not well structured. Open ditches can be used to drain water from low, ponded spots, and they are useful in the control of flooding. Proper timing of tillage is extremely important because tilth will be destroyed on these soils if they are worked when too wet. In addition to timeliness of tillage, keeping it to a minimum and returning crop residue to the soil help to maintain good tilth. Heavy applications of fertilizer according to soil test are needed to maintain high fertility for good growth of crops. Row crops can be grown continuously if high fertility and content of organic matter are maintained, tillage is kept to a minimum, and good tilth is maintained. Undrained pastures can be planted in reed canarygrass. Specialty plants, such as wild rice, can be planted for wildlife habitat.

CAPABILITY UNIT IIw-2

This unit consists of deep, nearly level or gently sloping, somewhat poorly drained soils of the Del Rey; Hebron, mottled subsoil variant; Lamartine; Muscatine; Stronghurst; and Thackery series. These soils are in valleys on benches and on uplands in areas that receive seepage or runoff from higher slopes. Their subsoil is moderately fine textured. It is underlain by sand, glacial till, lake-laid silt and clay, or sand and gravel outwash.

The content of organic matter is moderately high or high in soils of this unit, and natural fertility is moderate to high. Available water capacity is moderate to high, and permeability is moderate to moderately slow. The water table fluctuates between depths of 1 and 3 feet during part of the year and delays cultivation in spring. The soils in this unit warm slowly in spring and cool quickly in fall. They are subject to infrequent flooding of short duration. The hazard of erosion is moderate on the gently sloping soils.

Soils in this unit are suited to corn, soybeans, small grains, and clover. Drained areas also are suited to alfalfa. The main crops are corn, soybeans, oats, and clover. The soils are suited to pasture, trees, and wildlife habitat.

If soils in this unit are adequately drained, they are easily cultivated and are highly productive. The major management requirements are reducing wetness and the hazard of flooding, controlling erosion, maintaining or improving tilth and fertility, and increasing soil temperature. Diversions that intercept runoff from higher slopes, and random tile lines that intercept seepage and drain extremely wet spots generally provide adequate drainage. The diversions also help to control erosion. Keeping tillage to a minimum and to the proper times, and returning crop residue to the soil help to improve tilth and fertility. Applying lime and fertilizer according to soil test helps to maintain or improve fertility.

CAPABILITY UNIT IIw-5

This unit consists of moderately deep, nearly level and gently sloping, poorly drained and somewhat poorly drained loams and silt loams on benches in valleys. These soils are in the Dells, Lawler, Marshan, Matherton, Sebewa, and Shiffer series. They are underlain by loose outwash sand or sand and gravel.

Natural fertility is moderate to high in soils of this unit. Available water capacity is moderate or high, and permeability is moderate. Ground water fluctuates between depths of 1 and 3 feet and is at or near the surface most of the year in some soils and only during wet periods in others. Soils in this unit warm slowly in spring and cool quickly in fall. Nearly level soils are subject to short periods of flooding at infrequent intervals. In places water ponds on nearly level soils long enough to interfere with tillage operations. Gently sloping soils of this unit have a moderate hazard of erosion.

Soils in this unit are suited to corn, soybeans, small grains, and clover. Drained areas also are suited to alfalfa. The main crops are corn, oats, and clover. The soils are suited to pasture, trees, and wildlife habitat.

Cultivation of soils in this unit is fairly difficult because of wetness, and a drainage system is needed. The major management requirements are reducing wetness and the hazard of flooding, controlling erosion, maintaining or improving tilth, improving fertility, and increasing soil temperature. Diversions that intercept runoff or seepage from higher slopes, and open ditches that lower the water table generally provide adequate drainage. Open ditches in nearly level soils need to be closer together than open ditches in gently sloping soils. Surface drains can be used to drain ponded areas. Keeping tillage to a minimum and at the proper time, returning crop residue to the soil, and applying barnyard manure will maintain or improve tilth and permeability and maintain or increase the content of organic matter. Applying lime and fertilizer according to soil test will help to maintain or improve fertility.

CAPABILITY UNIT IIw-8

The only soil in this unit is Palms muck. It is a moderately deep, nearly level, poorly drained soil on very low benches of bottom lands in stream valleys. The underlying material is silt and loam.

The content of organic matter is very high in this soil, and natural fertility is low. Available water capacity is high, and permeability is moderate. Ground water is at or near the surface most of the year, and this soil floods frequently.

If this soil is adequately drained, it is suited to all of the major crops grown in the county. Undrained areas are suited to limited use for pasture and are excellently suited to wildlife habitat.

This soil warms slowly in spring and cools quickly in fall. Areas that are drained and cultivated are subject to a slight hazard of soil blowing. The major management requirements are lowering the water table, controlling flooding, improving fertility, protecting from soil blowing, and raising the temperature of the soil.

If cultivated crops are grown, tiles to provide drainage and ditches to help control flooding are necessary. Tile drains are placed at as shallow a depth as design criteria allow and covered with topsoil because permeability is slower in the loamy material. Surface drains remove ponded water. Keeping tillage to a minimum, tilling at the proper time, and returning crop residue to the soil help prevent soil blowing. Applying lime and fertilizer according to soil test helps to improve fertility. Row crops can be grown continuously in drained areas if intensive management is applied. Undrained areas can be planted to reed canarygrass and used for limited pasture. High-quality wildlife habitat can be produced by planting specialty crops and by using such other practices as level ditching.

CAPABILITY UNIT IIw-11

This unit consists of deep, nearly level to gently sloping, moderately well drained and well drained silty soils of the Arenzville and Huntsville series. They formed in alluvium on flood plains and in narrow drainageways and draws.

The content of organic matter is high in soils of this unit. Available water capacity is high, and permeability is moderate. Areas of these soils are subject to streambank cutting and to occasional flooding for short periods. These floods continually add fresh sediment to the soils. The hazard of erosion is moderate in areas of gently sloping soils.

Unprotected areas of these soils are suited to limited use for row crops, forage, and trees; but they provide excellent habitat for wildlife. Under intensive manage-

ment, corn, soybeans, oats, alfalfa, or clover can be grown.

These soils are relatively fertile and easy to cultivate. The major management requirements are controlling erosion and flooding and maintaining tilth and fertility. Plantings and structures on streambanks prevent or reduce cutting by streams. Diversions and grassed waterways intercept and channel runoff. These and other practices, such as keeping tillage to a minimum and applying fertilizer according to soil tests will provide for more years of corn and fewer years of meadow in the cropping system.

CAPABILITY UNIT IIw–13

In this unit are Alluvial land and soils in the Orion and Wallkill series. They are deep, nearly level, somewhat poorly drained and poorly drained silty soils that formed in alluvium on flood plains.

Natural fertility is moderate or high in soils of this unit, but the soils are difficult to cultivate. Available water capacity is high, and permeability is moderate. Ground water is at a depth of 1 to 3 feet during wet seasons. These soils are subject to frequent flooding, which adds fresh sediment to the soil (fig. 8), and to streambank cutting.

Drained areas of these soils are suited to corn, small grains, and clover. Undrained areas are suitable for pasture, trees, or wildlife habitat. Corn and clover are the main crops.

The major management requirements are controlling flooding, lowering the water table, and stabilizing streambanks. Open ditches and surface drains help to lower the water table. Plantings and structures reduce or prevent streambank erosion. Diversions and grassed waterways intercept and channel runoff. These and other practices such as keeping tillage to a minimum, returning crop residue to the soil, and applying fertilizer according to soil test will permit more years of corn and fewer years of meadow in the cropping system.

Figure 8.—**Profile of an Orion silt loam showing layers of fresh, silty alluvium over the older, dark-colored alluvium at a depth of about 3 feet.**

CAPABILITY UNIT IIs–1

In this unit are moderately deep, nearly level, well-drained loams and silt loams of the Fox, Meridian, Pillot, and Tell series. Also in this unit is Dakota loam, 0 to 2 percent slopes. These soils have a medium-textured subsoil that is underlain by loose outwash sand or sand and gravel. They are on benches on outwash plains. The plow layer is uneroded or only slightly eroded.

The content of organic matter is medium, and natural fertility is moderate in soils of this unit. Available water capacity is moderate and permeability is moderate. Ground water is at a depth of 3 to 5 feet or more during wet periods. All soils in this unit are moderately droughty.

Soils in this unit are well suited to all crops commonly grown in the county. Corn, soybeans, small grains, and alfalfa are the main crops. The soils also are suited to pasture and wildlife habitat.

These soils are easily cultivated. Major management requirements are maintaining the content of organic matter, maintaining tilth, conserving moisture, and improving fertility. Keeping tillage to a minimum, applying barnyard manure to the soil, returning crop residue to the soil, and growing green manure crops help to maintain the content of organic matter and conserve moisture. These, along with such practices as applying lime and fertilizer according to soil test, will improve production. Under a program of intensive management, more years of row crops and fewer years of hay can be grown safely. Management of woodlots is given in the "Woodland" section of this survey.

CAPABILITY UNIT IIs–7

This unit consists of deep, nearly level, well-drained loams in the Hebron and Ockley series. These soils are on benches in old lake basins and on outwash plains.

Natural fertility is high. Available water capacity is moderate, and permeability is moderately slow to moderate. Ground water is at a depth of at least 5 feet during wet periods. The hazard of soil blowing is slight on Ockley soils.

Soils in this unit are suited to all of the crops commonly grown in the county. Corn, small grains, alfalfa, and clover are the main crops. The soils also are suited to trees and to wildlife habitat.

The soils of this unit are easily cultivated. The major management requirements are maintenance of organic-matter content and tilth, improvement of soil fertility, conservation of moisture, and control of erosion. Planting winter cover crops, applying barnyard manure, returning crop residue to the soil, and plowing down green manure crops help to increase the content of organic matter, control soil blowing, increase fertility, and conserve moisture. These, and such practices as applying lime and fertilizer according to soil test, help to improve production. Management of woodlots is given in the "Woodland" section of this survey.

CAPABILITY UNIT IIIe-1

In this unit are soils of the Ashdale, Cadiz, Dodge, Downs, Durand, Fayette, Flagg, Griswold, Juda, Lindstrom, Miami, Myrtle, Ockley, Ogle, Palsgrove, Pecatonica, Saybrook, Tama, Westville, and Winnebago series These soils are deep, sloping, well-drained loams and silt loams. They are on uplands, on hillsides over colluvium, and on benches in valleys of streams. Soils in this unit have a subsoil that is thick and moderately fine textured. These soils are underlain by loam, loose outwash sand and gravel, or clay residuum from limestone bedrock. Soils that are only slightly eroded have a slightly thicker surface layer and are easier to cultivate than other soils in this unit.

Natural fertility is moderate or high. Good tilth is easy to maintain but is maintained more easily in Durand, Saybrook, Ogle, Tama, and Winnebago soils than in other soils. The available water capacity is high, and permeability is moderate and moderately slow. The hazard of erosion is severe.

These soils are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. The soils are well suited to trees and to use as pasture and as wildlife habitat.

The major requirements in management are the control of erosion and the maintenance of fertility and content of organic matter.

Soils of this unit in cultivated areas are subject to damage by water erosion. Contour stripcropping, diversions, terraces, and grassed waterways help to prevent such damage. Corn can be grown for additional years in cultivated areas, and the areas will not have to be used as meadows for so many years if tillage is kept to a minimum, crop residue is returned to the soil, and barnyard manure and fertilizer are applied. Suggested management for woodlots is given in the "Woodland" section.

CAPABILITY UNIT IIIe-2

In this unit are soils in the Arland, warm variant, Dodgeville, Fox, Gale, Hixton, Meridian, Mifflin, New-Glarus, Pillot, Rockton, Sylvester, Tell, and Whalan series. They are moderately deep sloping, well-drained silt loams and loams on uplands and benches in valleys of streams. The subsoil is medium textured to moderately fine textured. It is underlain by sand over sandstone bedrock, clay over limestone bedrock, loose sand, or sand and gravel at a depth of less than 40 inches.

Natural fertility is moderate or high in these soils. Available water capacity is moderate and permeability is moderate and moderately slow. Ground water is at a depth of more than 5 feet during wet periods.

These soils are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa, but the soils are also suited to pasture, trees, or wildlife habitat.

Generally, slightly eroded areas of soils in this unit have better tilth than moderately eroded areas. These soils are slightly droughty, and the hazard of erosion is severe. The major management requirements are controlling erosion, conserving moisture, and maintaining or improving tilth, organic-matter content, and fertility.

If these soils are used for cultivated crops, conservation practices that control erosion and conserve moisture are necessary. Contour stripcropping, terracing, and using diversions and grassed waterways help control erosion. Keeping tillage to a minimum, returning crop residue to the soil, applying fertilizer according to soil test, applying barnyard manure, and other practices also are helpful. If many or all of these practices are used, a cropping system that has more years of row crops and fewer years of meadow can be applied. Suggested management practices for woodlots are outlined in the "Woodland" section of this survey.

CAPABILITY IIIe-3

This unit consists of shallow, gently sloping, well-drained silt loams or loams in the Dunbarton, Edmund, Elkmound, and Northfield series. These soils are on ridgetops. The thin, medium-textured or fine-textured subsoil is underlain by limestone or sandstone at a depth of 10 to 20 inches.

These soils are difficult to cultivate. Natural fertility is moderately low, and the content of organic matter is moderate or moderately low. Available water capacity is low, and permeability ranges from moderately slow to moderately rapid. Ground water is at a depth of more than 5 feet. These soils are subject to severe erosion and are severely droughty during dry years because they are gently sloping and shallow.

The soils of this unit are suited to all crops commonly grown in the county if proper conservation practices are applied. The major crops are alfalfa, oats, and corn. Alfalfa grows especially well on these soils. The soils are also suited to pasture, trees, and wildlife habitat.

In places where the clayey subsoil has been plowed into the surface layer, tilth is poor. The major management requirements are control of erosion, conservation of moisture, and improvement or maintenance of tilth and fertility. If row crops are to be grown successfully, such conservation practices as contour stripcropping and grassed waterways are needed. Other practices such as keeping tillage to a minimum, returning crop residue to the soil, applying barnyard manure, and applying lime and fertilizer according to soil test are also helpful. Suggested management practices for woodlots are outlined in the "Woodland" section of this survey.

CAPABILITY UNIT IIIe-5

The only soil in this unit is Chaseburg silt loam, 6 to 12 percent slopes. It is a deep, sloping, well-drained soil that formed in alluvium on upland drainageways, hillsides, and fan-shaped draws.

This soil is relatively fertile. Available water capacity is high, and permeability is moderate. Ground water is at a depth of 5 feet or more. The soil is subject to frequent flooding for short periods and, because it is in areas that collect water, is subject to gullying. The hazard of erosion is severe.

If this soil is properly managed, it is suited to all crops commonly grown in the county. The main crops are small grains, alfalfa, and bluegrass, but the soil is better suited to pasture, trees, or wildlife habitat.

This soil is easy to cultivate. Many areas of it can be protected from runoff by diversions and grassed waterways. Sloping, shaping, and seeding of the natural waterways are essential to the efficiency of a grassed waterway. Inaccessible or frequently flooded areas can be left in pasture or trees. Keeping tillage to a minimum, returning crop residue to the soil, using fertilizer according to soil

test, and other suitable management practices allow more years of row crops and fewer years of meadow in the cropping system. Suggested management practices for woodlots are outlined in the "Woodland" section of this survey.

CAPABILITY UNIT IIIe-6

Morley silt loam, 6 to 12 percent slopes, eroded, is the only soil in this unit. It is a deep soil on glaciated upland ridges. The subsoil is clayey.

Natural fertility is moderate, and the content of organic matter is moderate to moderately low in this soil. Available water capacity is high, and permeability is moderately slow. Ground water is at a depth of 5 feet or more. Runoff is high during periods of heavy rainfall. The hazard of erosion is severe, and eroded areas are in poor tilth.

If this soil is properly managed, it is suited to all crops commonly grown in the county. Corn, oats, alfalfa, and clover are the main crops, but this soil can also be used for pasture, trees, or wildlife habitat.

This soil is difficult to cultivate. The major management requirements are control of erosion and improvement or maintenance of permeability. Keeping tillage to a minimum, applying fertilizer heavily according to soil test, returning crop residue to the soil, and plowing down green manure crops help raise the level of fertility and improve tilth. These and other practices such as terracing, using grassed waterways and diversions, and contour stripcropping help control runoff and reduce the hazard of erosion. Under intensive management, more years of row crops and fewer years of hay can be used in the cropping system. Suggested management practices for woodlots are outlined in the "Woodland" section of this survey.

CAPABILITY UNIT IIIe-7

This unit consists of deep and moderately deep, gently sloping and sloping, well-drained and somewhat excessively drained soils in the Billett, Eleva, Fox, and Oshtemo series. These soils are on benches in valleys of streams. The medium-textured and moderately coarse textured subsoil is underlain by sand and gravel at a depth of 20 to 60 inches.

Natural fertility is low to moderate in these soils. Available water capacity is low to moderate, and permeability is moderate to moderately rapid. Ground water is at a depth of 5 feet or more. The soils in this unit are moderately droughty, and the hazard of erosion is severe.

If these soils are properly managed, they are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa, but the soils are also suited to meadow, pasture, trees, or wildlife habitat.

These soils are easy to cultivate. The major management requirements are improvement of organic-matter content and fertility, conservation of moisture, and control of erosion. Contouring and contour stripcropping help control erosion and conserve moisture. Other practices, including keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure help conserve moisture, raise the content of organic matter, and slow erosion. Applying lime and fertilizer according to soil test increases fertility. Suggested management practices for woodlots are outlined in the "Woodland" section of this survey.

CAPABILITY UNIT IIIw-9

The only soil in this unit is Houghton mucky peat, a deep, nearly level, poorly drained soil on very low benches in stream valleys and old lake basins.

The content of organic matter is very high in this soil, and natural fertility is moderately low. Available water capacity is high, and permeability is moderately rapid. In undrained areas the water table is at a depth of less than 1 foot most of the year. Some areas of this soil are subject to frequent flooding for long periods. Areas that are drained and cultivated have a slight hazard of soil blowing. In places the peat has minor shortages of essential nutrients.

If this soil is adequately drained, it is well suited to most crops commonly grown in the county. Corn, soybeans, oats, and clover are the main crops. Undrained areas provide excellent sites for wildlife habitat but are suited to only limited use for pasture.

The major management requirements for crop production are lowering the water table, controlling flooding, improving fertility, and protecting from soil blowing. If cultivated crops are grown, a good drainage system of tile and open ditches is needed. Open ditches can be used to remove ponded water. Keeping tillage to a minimum and returning crop residue to the soil are among the practices that help maintain permeability and tilth. Applying lime and fertilizer according to soil test protects against nutrient shortage. Row crops can be grown continuously in a cropping system in drained areas that are properly managed. Undrained areas can be planted to reed canarygrass and used for limited pasture. Excellent wildlife habitat can be developed by planting specialty plants such as wildrice and by using practices such as level ditching.

CAPABILITY UNIT IIIs-4

This unit consists of moderately deep and deep, nearly level, somewhat excessively drained sandy loams in the Billett, Dickinson, and Oshtemo series. These soils are on benches in stream valleys. They have a moderately coarse textured subsoil and are underlain by sand and gravel at a depth of 20 to 60 inches.

Natural fertility is low or moderate in these soils. Available water capacity is low or moderate, and permeability is moderate and moderately rapid. Ground water is at a depth of more than 5 feet. The soils are severely droughty, and the hazard of soil blowing is moderate.

If these soils are properly managed, they are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa; but these soils are also suited to pasture, trees, or wildlife habitat.

Soils in this unit are easy to cultivate. The major management requirements are improvement of organic-matter content and fertility, conservation of moisture, and control of erosion. Such practices as contouring and stripcropping help control soil blowing and conserve moisture. Other practices such as keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure help conserve moisture, raise the content of organic matter, and control erosion. Applying lime and fertilizer according to soil test raises the level of fertility. Suggested management practices for woodlots are outlined in the "Woodland" section of this survey.

CAPABILITY UNIT IVe-1

Soils in this unit are in the Ashdale, Fayette, Lindstrom, Miami, Palsgrove, Pecatonica, and Westville series. They are deep, moderately steep, well-drained silt loams. These soils have a thick, moderately fine textured subsoil. They are underlain by loamy glacial till or clay residuum derived from dolomite bedrock. Most of these soils are moderately eroded. Areas of slightly eroded soils have a slightly thicker surface layer and are easier to cultivate than areas of soils that are moderately eroded.

Natural fertility is medium or high in these soils. Available water capacity is high, and permeability is moderate in the upper part of the soil and moderate to moderately slow in the underlying material. Good tilth can be maintained in areas where the soils are protected. The dark soils in this unit are easier to maintain in good tilth than the lighter ones. All soils respond well to applications of manure and to applications of fertilizer according to soil test. The hazard of erosion is very severe for all soils. Major management requirements are the control of erosion and the maintenance of fertility and the content of organic matter.

These soils are well suited to small grains, meadow or pasture, trees, or wildlife habitat. Corn can be grown successfully in areas of soil that are adequately protected from erosion.

Contour stripcropping, diversions, and grassed waterways help to control erosion in cultivated areas. These practices along with such practices as keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure and fertilizer increase the number of years row crops can be grown and decrease the number of years the cultivated areas must be used as meadow. Suggested management for woodlots is in the "Woodland" section.

CAPABILITY UNIT IVe-2

This unit consists of sloping and moderately steep, well-drained silt loams and loams. These soils are in the Arland, warm variant, Dodgeville, Gale, Mifflin, New-Glarus, Rockton, and Whalan series. They have a medium-textured to fine-textured subsoil. Soils in this unit are underlain by sand over bedrock or clay over limestone bedrock.

Natural fertility generally is moderate in soils of this unit. Available water capacity is moderate, and permeability is moderate or moderately slow. Ground water is at a depth of more than 5 feet throughout the year.

If soils in this unit are well managed, they are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. The soils are suited to pasture, trees, and wildlife habitat.

Moderately steep soils in this unit are difficult to cultivate. Tilth is good in areas of slightly eroded and moderately eroded soils that have slopes of 12 to 20 percent. Severely eroded, sloping soils are poor in tilth. They are difficult to cultivate because of the severe erosion and the resulting poor tilth, low fertility, and low content of organic matter.

These severely eroded soils are moderately droughty, and the hazard of further erosion is severe. Control of erosion is the major management need of soils in this unit. Other concerns are conserving moisture, maintaining or improving tilth and fertility, and maintaining or increasing the content of organic matter. Practices that control erosion and conserve moisture are needed in cultivated areas. Contour stripcropping, diversions, and grassed waterways help to control erosion. Keeping tillage to a minimum, returning crop residue to the soil, applying fertilizer according to soil test, and applying barnyard manure are helpful practices. If these practices are used, the number of years row crops can be safely used in the cropping system can be increased, and the number of years the soils must remain in meadow can be decreased.

CAPABILITY UNIT IVe-3

This unit consists of shallow, well-drained, gently sloping soils in Dunbarton, Edmund, Elkmound, Mifflin, shallow variant, and Northfield series. They are underlain, at a depth of less than 20 inches, by sand over sandstone bedrock or clay over dolomite bedrock.

Natural fertility is low in soils of this unit. Available water capacity is low, and permeability is moderately rapid to moderately slow. The soils are severely droughty, and the hazard of further erosion is very severe.

Soils in this unit are not well suited to row crops, but under good management certain row crops can be grown in a cropping system. The main crops are oats and alfalfa. The soils are better suited to meadow, pasture, trees, and wildlife habitat than to other uses.

Tilth generally is better in areas where the soil is only slightly eroded than in other areas. Such areas generally are wooded or are in permanent pasture.

Major management needs are controlling erosion and conserving moisture. Other concerns are maintaining or improving tilth and fertility and maintaining or increasing the content of organic matter. Contour stripcropping, diversions, and grassed waterways help to control erosion. Other helpful practices are keeping tillage to a minimum, returning crop residue to the soil, applying fertilizer according to soil test, and applying barnyard manure. Management practices for woodlots are in the "Woodland" section of this survey.

CAPABILITY UNIT IVe-4

The only soil in this unit is Lindstrom sandy loam, 6 to 12 percent slopes, eroded. It is a deep, sloping, well-drained soil in colluvial areas below sandstone uplands. The upper part of the subsoil is moderately coarse textured, and the lower part is medium textured and moderately fine textured. The soil is underlain by silt at a depth of 20 to 40 inches.

Natural fertility is moderate. Available water capacity is moderate and permeability is moderately rapid. Ground water is at a depth of more than 5 feet. This soil is severely droughty and is subject to very severe water erosion and soil blowing.

If this Lindstrom soil is properly managed, it is suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. The soil in this unit is better suited to meadows, pastures, trees, or wildlife habitat than to other uses.

The soil is easy to cultivate. The major management requirement is control of erosion, but improvement of organic-matter content and fertility and conservation of moisture are also required. Such practices as contouring and contour stripcropping help to control water erosion and soil blowing and to conserve moisture. Other

practices such as keeping tillage to a minimum, returning crop residue to the soil, and applying barnyard manure help conserve moisture, raise the content of organic matter, and reduce the hazard of erosion. Lime and fertilizer applied according to soil test increase fertility. If many or all of these practices are used, some row crops may be used in the cropping system. Suggested management practices for woodlots are outlined in the "Woodland" section of this survey.

CAPABILITY UNIT IVe-6

The only soil in this unit is Morley silt loam, 12 to 20 percent slopes, eroded. This is a deep soil on glaciated upland ridges. The subsoil is moderately fine textured and fine textured.

The content of organic matter is medium to moderately low, and natural fertility is moderate. Available water capacity is high, and permeability is moderately slow. Runoff is high in periods of heavy rainfall, and the hazard of further erosion is very severe. Tilth is very poor in areas of eroded soil.

If this soil is properly managed, it is suited to most crops commonly grown in the county. Corn, oats, alfalfa, and clover are the main crops, but the soil is better suited to meadows, pastures, trees, or wildlife habitat.

This soil is difficult to cultivate. The major management requirements are control of erosion and runoff. Keeping tillage to a minimum, applying manure heavily, returning crop residue to the soil, and plowing green manure crops under help maintain or improve tilth and increase the content of organic matter. Applying lime and fertilizer according to soil test helps increase fertility. These and other practices such as the use of grassed waterways, diversions, and contour stripcropping help control runoff and reduce erosion. If management is intensive, more years of row crops and fewer years of hay can be used in the cropping system. Suggested management practices for woodlots are outlined in the "Woodland" section of this survey.

CAPABILITY UNIT IVe-7

This unit consists of moderately deep, moderately steep sandy loams in the Eleva and Fox series. These soils have a moderately thick, medium-textured and moderately fine textured subsoil. The soils are underlain by sandstone bedrock and sand and gravel.

If the soils in this unit are cultivated, the hazard of erosion is very severe because of the moderately steep slopes. Natural fertility is moderate. Available water capacity is moderate, and permeability is moderate and moderately rapid.

The main crops are oats, alfalfa, and bluegrass, but trees to be cut for timber also are grown. The soils of this unit are well suited to meadows, pastures, trees, or wildlife habitat.

The major management requirement is controlling erosion, but conserving moisture, improving fertility and tilth, and increasing the content of organic matter also are necessary. Crops respond favorably to applications of barnyard manure, lime, and fertilizer to the soil, and tilth is improved by such practices. In places diversions can be used to intercept runoff from higher slopes. Soils in this unit support fast-growing stands of hardwoods. Special plantings help develop excellent wildlife habitat. Suggested management practices for woodlots are outlined in the "Woodland" section of this survey.

CAPABILITY UNIT IVw-5

The only soil in this unit is Maumee sandy loam, a deep, nearly level, poorly drained soil on low benches in old lake basins.

This soil is difficult to cultivate because of wetness. Natural fertility is low. Available water capacity is low, and permeability is moderately rapid. This soil is subject to frequent floods for moderate periods, and water ponds on low areas, seriously delaying tillage operations. The water table is at a depth of 1 foot or less part of the year.

If this soil is adequately drained and cultivated, it has limited suitability for corn, oats, and clover. Most undrained areas are in bluegrass or meadows of sedge. These areas are suited to use as meadow, pasture, or wildlife habitat. The major management requirements are reducing wetness and controlling flooding, draining ponded areas, and improving and maintaining tilth and fertility.

CAPABILITY UNIT IVw-7

The only soil in this unit is Adrian muck, a deep, nearly level, poorly drained soil on very low benches in stream valleys and old lake basins. It is underlain by sand at a depth of 20 to 40 inches.

The content of organic matter is very high in this soil, and natural fertility is low. Available water capacity is high, and permeability is moderately rapid. In undrained areas the water table is at a depth of less than 1 foot most of the year. This soil is frequently flooded for long periods. Drained and cultivated areas have a slight hazard of soil blowing. Some areas have minor shortages of essential nutrients.

If this soil is adequately drained, it is suited to most crops commonly grown in the county. Corn, soybeans, oats, and clover are the main crops. Undrained areas are better suited to wildlife habitat or limited pasture than to other uses.

The major management requirements are lowering the water table, controlling flooding, improving fertility, and protecting from soil blowing. A good system of open ditches is needed in cultivated areas to provide internal drainage and help in the control of flooding. Open ditches can also be used to remove ponded water. Tile drains are suitable where organic material is thick enough to meet minimum design criteria. Practices such as keeping tillage to a minimum and returning crop residue to the soil help to maintain permeability and tilth and control soil blowing. Applying lime and fertilizer according to soil test protects against nutrient shortage. If the soil is properly managed, row crops can be grown year after year in drained areas. Undrained areas can be planted to reed canarygrass and used for limited pasture. Good wildlife habitat can be developed by planting specialty crops and by using level ditching and other suitable practices.

CAPABILITY UNIT IVs-3

This unit consists of deep and moderately deep loamy sands of the Gotham and Plainfield series. These nearly level and gently sloping soils are excessively drained. They are underlain, at a depth of 20 to 40 inches, by

loose outwash sand. In places soils in this unit have a slightly coherent subsoil.

Natural fertility is low in soils of this unit, and the content of organic matter is low to moderate. Available water capacity is low or very low. The soils are very droughty, and the hazard of soil blowing is severe.

If soils of this unit are managed well, they are suited to most crops grown in the county. The main crops are corn, oats, alfalfa, clover, and pine trees. The soils are well suited to use as meadow, pastures, wooded areas, and wildlife habitats.

The soils of this unit are easy to cultivate. The major management requirements are conserving moisture, controlling soil blowing, and improving fertility. The gentle slopes and sandy texture make the soils well suited to irrigation. Planting windbreaks, using wind stripcropping, mulching crop residue, and planting cover crops help to control soil blowing and maintain the content of organic matter. Keeping tillage to a minimum, applying barnyard manure, and applying lime and fertilizer according to soil test are also helpful practices. Row crops can be grown continuously if all or many of these practices are used along with supplemental irrigation. Suggested management of woodlots is given in the "Woodland" section of this survey.

CAPABILITY UNIT Vw-14

This capability unit consists of Alluvial land, wet, and a wet variant soil of the Orion series. These soils are deep, nearly level, and poorly drained. They have a subsurface layer of mixed sandy material and alluvium.

Natural fertility is moderately high in soils of this unit. Available water capacity is high, and permeability is moderately slow. The water table is at a depth of 1 foot or less much of the year. The soils are frequently flooded for long periods. Generally, drainage is not feasible because of a lack of suitable outlets.

These soils are better suited to pasture, trees, or wildlife habitat than to other uses. Areas used for pastures need renovation if it is feasible, however, and areas used for trees generally need improvement. The major crops are clover, bluegrass, and various kinds of water-tolerant trees. Soils in this unit provide excellent wildlife habitat, and special plantings and level ditching in areas used for this purpose provide cover and winter food. The major management requirements are reducing flooding and maintaining good vegetative cover.

CAPABILITY UNIT VIe-1

The only soil in this unit is Palsgrove silty clay loam, 12 to 20 percent slopes, severely eroded. This is a deep, well-drained soil that has a thick, moderately fine textured subsoil underlain by clay residuum derived from limestone bedrock.

If this soil is cultivated, the hazard of erosion is very severe. Tilth is very poor. Available water capacity is high and permeability is moderately slow.

The main crops grown are oats, alfalfa, bluegrass, and trees to be cut for timber. The soil is not suited to all crops commonly grown in the county, but it is well suited to pasture, trees, and wildlife habitat.

The major management requirement is controlling erosion, but other concerns are increasing fertility and content of organic matter and improving tilth. Applications of barnyard manure and applications of lime and fertilizer according to soil test improve tilth and help produce more favorable crops. In places diversions can be used to intercept runoff from higher slopes. These soils will support fast-growing stands of hardwoods. Special plantings help develop excellent wildlife habitat. Suggested management practices for woodlots are outlined in the "Woodland" section of this survey.

CAPABILITY UNIT VIe-2

This unit consists of moderately deep, moderately steep and steep, well-drained silt loams in the Gale and New-Glarus series. These soils have a moderately thick, moderately fine textured subsoil underlain by sandstone or clay residuum from limestone bedrock at a depth of 20 to 40 inches. Severely eroded areas are on the less steep slopes.

If the soils of this unit are cultivated, the hazard of erosion is very severe because of moderately steep or steep slopes. Tilth is poor. Natural fertility is moderate on slightly eroded and moderately eroded soils and moderately low on severely eroded soils. Available water capacity is moderate, and permeability is moderate and moderately slow. Crops grown on these soils respond to applications of fertilizer. Operation of farm machinery on these soils is difficult.

The soils in this unit are not suited to all crops commonly grown in the county. The main crops are oats, alfalfa, trees to be cut for timber, and bluegrass. These soils are better suited to use for pasture and trees than for cultivated crops, and they are well suited to wildlife habitat.

The major management requirement is controlling erosion. Other concerns are conserving moisture, increasing fertility and content of organic matter, and improving tilth. Applications of barnyard manure and applications of lime and fertilizer according to soil test help improve tilth and produce maximum yields. In some places diversions can be used to intercept runoff from higher slopes. These soils will support stands of hardwoods. Special plantings help develop excellent wildlife habitat. Suggested management practices for woodlots are outlined in the "Woodland" section of this survey.

CAPABILITY UNIT VIe-3

This unit consists of shallow, sloping to moderately steep, well-drained loams and silt loams in the Dunbarton, Edmund, Elkmound, Mifflin, shallow solum variant, and Northfield series. These soils have a thin, fine textured or moderately fine textured subsoil underlain by sandstone or limestone bedrock at a depth of 12 to 20 inches. Severely eroded areas are on the less steep slopes.

If soils of this unit are cultivated, they are very droughty, and the hazard of erosion is very severe because of slope and shallow depth. Tilth is very poor. Natural fertility is low in all soils of this unit. Available water capacity is low, and permeability ranges from moderately slow to moderately rapid. Crops grown on soils of this unit respond to fertilizer that is applied according to soil test.

The soils in this unit are not suited to all crops commonly grown in the county. The main crops are oats, alfalfa, and bluegrass. The soils are better suited to use

for pasture and trees than for cultivated crops, and they are well suited to wildlife habitat.

The major management requirement is controlling erosion. Other concerns are conserving moisture, increasing fertility and content of organic matter, and improving tilth. Applications of barnyard manure and applications of lime and fertilizer according to soil test help to improve tilth and produce maximum growth. In places diversions can be used to intercept runoff from higher slopes. Special plantings help develop excellent wildlife habitat. Improved growth can be obtained by correlating tree species with the type of soil. Your local forester or woodland conservationist and the "Woodland" section of this survey will provide guidance in matching trees to soils.

CAPABILITY UNIT VIe-4

The only soil in this unit is Lindstrom sandy loam, 12 to 20 percent slopes, eroded. This is a deep soil that has a moderately coarse textured subsoil underlain by silt at a depth of 20 to 40 inches.

If this soil is cultivated, the hazard of erosion is severe because of steep slopes. Natural fertility is low. Available water capacity and permeability are moderate.

This soil is not suited to the cultivated crops commonly grown in the county because of its steep slopes. The main crop is bluegrass, but many areas are idle. This soil is better suited to use for limited pasture or as wildlife habitat than it is to cultivated crops.

The major management requirement, controlling erosion, is critical on this steep soil. Other requirements are conserving moisture, increasing fertility and content of organic matter, and improving tilth. If this soil is cultivated, it is very susceptible to further erosion. Applications of barnyard manure and applications of lime and fertilizer according to soil test increase the growth of grass.

CAPABILITY UNIT VIs-3

Only the land type Terrace escarpments is in this unit. The escarpments are deep, steep, moderately well drained to excessively drained, and loamy. They are on breaks between benches.

Natural fertility is low. Available water capacity is low, and permeability is rapid. Drought is the main hazard on this land type, but it is also subject to water erosion and soil blowing. The land cannot safely be used for crops, because it is too steep and too droughty and it is subject to soil blowing.

The soil is better suited to trees, pasture, recreational areas, and wildlife habitat than to other uses. Careful management is necessary to establish and maintain vegetation for pasture or forage production. Grazing should be controlled to maintain good sod cover on pastures. Many areas of this soil are wooded. These areas should be protected from livestock. Satisfactory returns can be realized if woodlots are managed properly.

CAPABILITY UNIT VIs-5

This unit consists of very shallow, gently sloping to steep, well-drained and excessively drained sands and loams in the Rodman and Sogn series. These soils do not have a subsoil. They are underlain by gravelly outwash or limestone bedrock.

The hazard of erosion is very severe in cultivated areas. Natural fertility is very low. Available water capacity is very low, and permeability ranges from moderate to rapid.

Soils of this unit are not suited to most crops commonly grown in the county, because they are very shallow and are gently sloping to steep. The main crop is bluegrass. The soils are better suited to use for pasture and wildlife habitat than to other uses.

The major management requirement is controlling erosion. Other requirements are conserving moisture, increasing fertility and content of organic matter, and improving tilth. Pasture renovation and application of lime and fertilizer according to soil test help to increase the growth of grass.

CAPABILITY UNIT VIIe-3

This unit consists of shallow, moderately steep and steep, well-drained loams in the Dunbarton, Elkmound, and Northfield series. They are on bedrock-controlled uplands. These soils have a thin, medium-textured or fine-textured subsoil.

The soils of this unit are difficult to cultivate because of steepness of slope, clayey subsoil, and shallow depth to bedrock. Severely eroded areas have poor tilth. The content of organic matter and the level of natural fertility are low. Available water capacity is low, and permeability ranges from moderately slow to moderately rapid. If these soils are cultivated, the hazard of erosion is very severe.

The soils of this unit are not well suited to the cultivated crops grown in the county because of relief and shallow depth to bedrock. Alfalfa and bluegrass are the main crops, but in places areas are idle or are in weeds. The soils are suited to use for limited pasture or trees or as wildlife habitat. The major management requirements are controlling erosion, which is critical on shallow soils, and conserving moisture. Other concerns are improving tilth, increasing fertility, and increasing the content of organic matter. If these soils are cultivated, they are very susceptible to erosion. The surface layer is severely eroded in some areas. For this reason tillage operations should be restricted to pasture renovation, tree planting, or improvement of wildlife habitat. Applying barnyard manure and applying lime and fertilizer according to soil test help to increase the growth of grass and to enable the soil material to utilize moisture efficiently. In places diversions can be used to intercept runoff from higher slopes. Special plantings help develop excellent wildlife habitat. Suggested management practices for woodlots are outlined in the "Woodland" section of this survey.

CAPABILITY UNIT VIIs-6

This unit consists only of the land type Steep stony and rocky land. Most areas are underlain by limestone or sandstone bedrock.

Natural fertility and available water capacity are low in this land type. The hazard of erosion is very severe.

This land type is not suited to crops because of shallow depth and steep slopes. It is better suited to trees and wildlife habitat. Many areas are wooded or are in bluegrass, but many other areas are idle.

Stoniness and topography make cultivation difficult. Practices that conserve moisture and control erosion are the major management requirements. These practices are

especially needed in shallower areas of soil material. Planting trees and planting vegetation to improve wildlife habitat help to control erosion and provide a source of income. Suggested management practices for woodlots are outlined in the "Woodland" section of this survey.

CAPABILITY UNIT VIIs-9

The only soil in this unit is Boone fine sand, 2 to 20 percent slopes. This is a moderately deep, excessively drained soil that has a thin, moderately coarse textured subsoil. The underlying material is loose sand.

If this soil is cultivated, it is very susceptible to erosion. Natural fertility and available water capacity are low, and permeability is rapid. This soil is very droughty. When it is cultivated, the hazards of water erosion and soil blowing are very severe.

This soil generally is not suited to cultivated crops because of steep slopes, limited depth, droughtiness, and erosion hazard. Under intensive management, some harvestable crops can be grown. The main crops are bluegrass and, in places, trees for timber. Widely spaced, low-growing junipers are the only plants that grow well on this soil. Many areas are idle. This soil is more suitable for limited pasture, trees, or wildlife habitat than for cultivated crops (fig. 9).

The major management requirements are conserving moisture and controlling erosion. Other concerns are improving fertility and maintaining organic-matter content and tilth. Applications of barnyard manure and applications of lime and fertilizer according to soil test help to increase the growth of grass. Planting trees and other plants to improve habitat for wildlife helps in the control of erosion, and many provide a source of income. Suggested management practices for woodlots are outlined in the "Woodland" section of this survey.

CAPABILITY UNIT VIIIs-10

This unit consists only of the nearly level, gravelly land type Riverwash. Small, scattered areas of this land type are in or near streams, in local drainageways, and in depositional fan-shaped areas.

Figure 9.—Typical area of Boone soils in capability unit VIIs-9.

This land type is infertile and droughty, and it is subject to frequent flooding for long periods. Available water capacity is low.

Riverwash is not suited to crops. No harvestable vegetation is grown, and the land generally is free of all vegetation. In places areas are used for wildlife habitat or recreation.

Estimated Yields

The estimated per-acre yields of the principal crops grown on each soil in Green County are listed in table 2. These estimates are based on interviews with farmers, on results obtained by agricultural experiment stations (*8*), and on observations made by soil surveyors, work unit conservationists, and farmers and other workers familiar with the soils.

Yields in table 2 are given for two levels of management: A, ordinary management, and B, improved management. Under the A level of management, one or more of the following practices applies to most fields: (1) the soil is inadequately limed, and reaction is pH 6.0 or less; (2) surface and internal drainage are not adequate to provide optimum drainage conditions; (3) weeds and insects are not adequately controlled; (4) seedbed preparation is sometimes inadequate or is carried out when the soil is too wet or too dry; (5) erosion-control measures are inadequate; and (6) fertility is too low for good crop growth.

For growth of field corn under the A level of management, nitrogen and potassium are usually in short supply. Corn of improper relative maturity is used, and seeding rates are too low. Seedbeds are in poor tilth.

Many fields in which oats are planted under the A level of management are underfertilized or not fertilized at all. Poor seed is used; it is planted too thick, too deep, and too late; and lodging is common.

For growth of legume-grass hay under the A level of management, varieties that are not sufficiently winter hardy and disease resistant are used. Stands are thin, and the hay is not cut at the proper time. Fields are cut or grazed during the period September 1 to mid-October. Insects are not controlled.

Under the B level of management, one or more of the following practices apply to most fields: (1) soils are limed to pH 6.5 according to soil test recommendations; (2) fertilizer is applied as prescribed by soil tests for the particular crop to be grown; (3) surface and internal drainage are adequate; (4) seedbed preparation and harvesting are adequate and timely; (5) erosion control is practiced continually; (6) cropping systems are suited to soil and slope conditions; and (7) weeds and insects are controlled by mechanical and chemical means.

Under the B level of management of field corn, soil fertility is maintained at a high level based on soil tests and expected yields of particular crops. Abundant organic matter is maintained through return of crop residue and application of barnyard manure. Minimum tillage is practiced to help maintain good tilth. The crop has a suitable relative maturity. Seeding rates are adjusted to provide a plant population that will produce the expected yield, and control of weeds and insects is complete.

For growth of oats under the B level of management, clean, viable seed of suitable varieties is planted at the

recommended rates, at shallow depths, and as early in spring as possible. Only short, stiff-strawed varieties are used. Stubble is clipped and removed after harvest.

For growth of legume and grass hay under the B level of management, only clean, viable seed of recommended varieties is planted, and only recommended seed mixtures are used. Oats are removed for fresh feed, silage, or hay if seeding is threatened by lodging or drought. Hay is cut early when its quality is highest, and hayfields are not grazed or cut between early September and mid October. Insects and weeds are thoroughly controlled, and grazing is very carefully managed.

TABLE 2.—*Estimated average yields per acre of principal crops grown under two levels of management*

[Yields in columns A are those expected under ordinary management; yields in columns B are those expected under an improved level of management. Absence of data indicates that the soil is not suitable for the crop or that the crop is not ordinarily grown on the soil]

Soil	Corn		Oats		Alfalfa-brome hay		Pasture	
	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Adrian muck [2]	------	85	-----	50	--------	3.0	60	130
Alluvial land [2]	40	80	45	65	1.5	3.5	-------	-------
Alluvial land, wet [2]	------	------	------	------	--------	--------	90	105
Arenzville silt loam [2]	80	110	50	70	3.5	4.5	140	180
Arland loam, warm variant, 2 to 6 percent slopes, eroded	60	80	45	65	2.0	3.5	75	110
Arland loam, warm variant, 6 to 12 percent slopes, eroded	55	75	40	60	1.8	3.0	70	110
Arland loam, warm variant, 12 to 20 percent slopes, eroded	45	70	35	55	1.5	2.3	55	95
Ashdale silt loam, 2 to 6 percent slopes, eroded	70	100	55	80	3.0	4.0	90	130
Ashdale silt loam, 6 to 12 percent slopes, eroded	65	90	50	70	2.8	3.5	90	125
Ashdale silt loam, 12 to 20 percent slopes, eroded	55	80	40	60	2.5	3.3	86	120
Billett sandy loam, 0 to 2 percent slopes	45	70	40	55	1.8	2.8	60	95
Billett sandy loam, 2 to 6 percent slopes, eroded	50	65	35	50	1.5	2.5	55	90
Billett sandy loam, 6 to 12 percent slopes, eroded	45	60	30	45	1.0	2.2	50	85
Boone fine sand, 2 to 20 percent slopes	------	------	20	35	--------	1.5	20	40
Brookston silt loam [2]	75	115	50	65	--------	4.0	80	145
Cadiz silt loam, 2 to 6 percent slopes, eroded	70	100	55	70	3.0	4.5	80	125
Cadiz silt loam, 6 to 12 percent slopes, eroded	60	90	45	60	2.8	4.3	75	120
Chaseburg silt loam, 2 to 6 percent slopes [2]	70	105	55	70	3.5	4.5	105	140
Chaseburg silt loam, 6 to 12 percent slopes [2]	------	------	------	------	--------	--------	100	135
Chaseburg and Arenzville silt loams	80	110	50	70	3.5	4.5	110	145
Colwood silt loam [1]	65	95	45	60	--------	4.0	85	135
Dakota loam, 0 to 2 percent slopes	55	75	45	60	2.0	3.0	85	120
Dakota loam, 2 to 6 percent slopes, eroded	50	70	40	60	1.8	2.8	80	115
Dells silt loam, 0 to 3 percent slopes [2]	50	90	55	80	2.0	4.5	100	135
Del Rey silt loam [2]	65	100	50	65	2.5	4.0	85	130
Dickinson sandy loam, 1 to 3 percent slopes	40	65	35	55	1.8	2.5	60	90
Dodge silt loam, 2 to 6 percent slopes, eroded	80	105	60	75	3.0	4.5	85	120
Dodge silt loam, 6 to 12 percent slopes, eroded	70	95	55	70	2.5	4.2	80	115
Dodgeville silt loam, 2 to 6 percent slopes, eroded	65	90	55	70	2.5	4.0	80	115
Dodgeville silt loam, 6 to 12 percent slopes, eroded	60	80	50	65	2.0	3.5	75	110
Dodgeville silt loam, 6 to 12 percent slopes, severely eroded	50	75	50	65	2.4	3.0	70	105
Dodgeville silt loam, 12 to 20 percent slopes, eroded	50	75	50	65	2.4	3.0	70	105
Downs silt loam, 2 to 6 percent slopes, eroded	85	120	60	75	3.0	4.8	105	140
Downs silt loam, 6 to 12 percent slopes, eroded	80	110	60	75	3.0	4.5	100	135
Downs silt loam, heavy substratum, 0 to 2 percent slopes	90	125	65	75	3.2	5.0	105	145
Downs silt loam, heavy substratum, 2 to 6 percent slopes	85	125	60	75	3.0	5.0	105	140
Downs silt loam, heavy substratum, 2 to 6 percent slopes, eroded	80	115	55	70	2.5	4.5	100	135
Downs silt loam, heavy substratum, 6 to 12 percent slopes, eroded	75	110	50	65	2.0	4.0	95	130
Dunbarton silt loam, 2 to 6 percent slopes, eroded	50	75	50	60	2.2	3.5	55	80
Dunbarton silt loam, 6 to 12 percent slopes, eroded	45	65	45	55	2.0	3.0	50	75
Dunbarton silt loam, 12 to 20 percent slopes, eroded	------	------	30	45	1.3	2.2	40	65
Dunbarton silt loam, 20 to 30 percent slopes, eroded	------	------	------	------	1.2	2.0	35	60
Dunbarton silty clay loam, 10 to 20 percent slopes, severely eroded	------	------	------	------	1.0	1.8	35	60
Durand silt loam, 2 to 6 percent slopes, eroded	85	115	60	70	3.0	4.8	95	130
Durand silt loam, 6 to 12 percent slopes, eroded	80	105	50	65	2.5	4.5	85	120
Edmund silt loam, 2 to 6 percent slopes, eroded	50	75	50	65	2.2	3.2	60	80
Edmund silt loam, 6 to 12 percent slopes, eroded	45	65	45	55	2.0	3.0	55	75
Edmund silt loam, 12 to 20 percent slopes, eroded	------	------	30	45	1.2	2.2	45	70
Eeva sandy loam, 6 to 12 percent slopes, eroded	45	70	40	50	1.5	2.5	50	85
Eeva sandy loam, 12 to 20 percent slopes, eroded	------	------	30	45	1.0	1.8	40	80
Elkmound sandy loam, 2 to 6 percent slopes, eroded	35	65	42	60	1.2	2.2	50	80
Elkmound sandy loam, 6 to 12 percent slopes, eroded	30	60	35	55	1.0	2.0	45	75
Elkmound sandy loam, 12 to 20 percent slopes, eroded	------	------	30	45	1.0	1.8	35	65
Elkmound sandy loam, 20 to 30 percent slopes, eroded	------	------	------	------	--------	--------	30	60
Elkmound sandy loam, 30 to 45 percent slopes	------	------	------	------	--------	--------	20	40

Footnotes at end of table.

TABLE 2.—*Estimated average yields per acre of principal crops grown under two levels of management*—Continued

Soil	Corn		Oats		Alfalfa-brome hay		Pasture	
	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Ettrick silt loam [2]	70	115	50	60	------	4.0	80	145
Fayette silt loam, 2 to 6 percent slopes, eroded	80	115	55	80	3.0	4.5	100	135
Fayette silt loam, 6 to 12 percent slopes, eroded	75	110	55	75	3.0	4.2	85	125
Fayette silt loam, 12 to 20 percent slopes, eroded	65	95	45	60	2.0	3.0	80	120
Fayette silt loam, benches, 0 to 2 percent slopes	85	120	60	80	3.0	4.5	110	145
Fayette silt loam benches, 2 to 6 percent slopes, eroded	80	115	55	80	3.0	4.5	100	135
Fayette silt loam, benches, 6 to 12 percent slopes	75	110	55	75	3.0	4.2	85	125
Fayette silt loam, loamy substratum, 2 to 6 percent slopes, eroded	80	115	55	80	3.0	4.5	100	135
Fayette silt loam, loamy substratum, 6 to 12 percent slopes, eroded	75	110	55	75	3.0	4.2	85	125
Fayette silt loam, loamy substratum, 12 to 20 percent slopes, eroded	70	100	45	70	2.0	3.5	80	120
Fayette silt loam, valleys, 6 to 12 percent slopes, eroded	75	110	55	70	3.0	4.5	85	125
Fayette silt loam, valleys, 12 to 20 percent slopes, eroded	70	100	45	70	2.0	3.5	80	120
Flagg silt loam, 0 to 2 percent slopes	85	110	60	80	3.0	4.5	100	135
Flagg silt loam, 2 to 6 percent slopes, eroded	75	105	60	75	3.0	4.5	100	135
Flagg silt loam, 6 to 12 percent slopes, eroded	65	90	50	70	2.5	3.5	85	125
Fox loam, 0 to 2 percent slopes	55	80	45	60	2.5	3.0	80	110
Fox loam, 2 to 6 percent slopes, eroded	50	80	40	60	2.0	3.0	75	105
Fox loam, 6 to 12 percent slopes, eroded	45	75	30	50	1.5	2.5	70	100
Fox sandy loam, 6 to 12 percent slopes, eroded	40	70	30	45	1.0	1.5	60	90
Fox sandy loam, 12 to 20 percent slopes, eroded	35	65	25	40	1.0	1.5	55	85
Fox slit loam, 0 to 2 percent slopes	65	90	55	70	2.5	3.5	80	115
Fox silt loam, 2 to 6 percent slopes, eroded	60	85	50	65	2.2	3.2	80	110
Gale silt loam, 2 to 6 percent slopes, eroded	60	85	55	65	2.8	4.0	75	115
Gale silt loam, 6 to 12 percent slopes, eroded	55	80	50	60	2.5	3.5	65	105
Gale slit loam, 12 to 20 percent slopes, eroded	45	70	40	50	2.0	3.0	60	100
Gale silt loam, 20 to 30 percent slopes, eroded	------	------	30	45	1.5	2.3	50	90
Gotham loamy sand, 0 to 2 percent slopes	40	65	40	55	1.5	2.7	50	85
Gotham loamy sand, 2 to 6 percent slopes, eroded	40	60	35	50	1.3	2.5	40	75
Gotham loamy sand, 6 to 12 percent slopes, eroded	35	50	30	40	1.0	2.0	30	70
Griswold silt loam, 2 to 6 percent slopes, eroded	70	100	50	70	3.0	4.5	80	120
Griswold silt loam, 6 to 12 percent slopes, eroded	65	95	50	65	2.8	4.0	75	115
Hebron silt loam, 0 to 2 percent slopes	80	110	55	70	3.0	4.5	80	115
Hebron silt loam, 2 to 6 percent slopes, eroded	70	95	50	65	2.5	4.0	75	100
Hebron silt loam, mottled subsoil variant, 0 to 3 percent slopes [2]	65	105	50	60	2.5	4.5	85	125
Hixton loam, 2 to 6 percent slopes, eroded	55	85	50	60	2.0	3.2	60	105
Hixton loam, 6 to 12 percent slopes, eroded	50	75	45	55	1.8	2.8	50	95
Houghton mucky peat [2]	------	100	------	60	------	3.5	60	130
Huntsville silt loam, 0 to 2 percent slopes [2]	85	115	50	70	3.5	4.5	115	150
Huntsville silt loam, 2 to 6 percent slopes [2]	80	105	45	65	3.0	4.0	110	140
Juda silt loam, 2 to 6 percent slopes, eroded	65	100	55	75	3.5	4.5	85	130
Juda silt loam, 6 to 12 percent slopes, eroded	55	90	50	65	3.0	4.0	75	120
Lamartine silt loam, 1 to 6 percent slopes [2]	65	100	50	65	1.8	3.9	90	125
Lawler loam, 0 to 2 percent slopes [2]	50	85	45	60	2.0	3.0	90	120
Lawler silt loam, 0 to 3 percent slopes [2]	55	95	45	65	2.0	4.0	95	130
Lindstrom sandy loam, 6 to 12 percent slopes, eroded	40	80	40	55	1.5	2.5	60	90
Lindstrom sandy loam, 12 to 20 percent slopes, eroded	35	70	35	50	1.0	2.0	50	80
Lindstrom silt loam, 6 to 12 percent slopes	75	105	50	65	3.0	4.0	100	145
Lindstrom silt loam, 12 to 20 percent slopes, eroded	65	90	40	60	2.0	3.2	90	135
Marshan loam [2]	------	80	------	50	------	2.5	70	130
Marshan silt loam [2]	------	95	------	70	------	3.5	70	145
Matherton silt loam [2]	50	90	45	60	1.5	3.5	80	135
Maumee sandy loam [2]	55	75	40	60	------	3.0	60	100
Meridian loam, 0 to 2 percent slopes	55	80	45	60	2.0	3.0	70	110
Meridian loam, 2 to 6 percent slopes, eroded	45	70	40	55	1.8	2.8	60	100
Meridian loam, 6 to 12 percent slopes, eroded	40	65	35	50	1.5	2.5	55	90
Miami silt loam, 2 to 6 percent slopes, eroded	75	100	60	75	3.2	4.8	80	115
Miami silt loam, 6 to 12 percent slopes, eroded	65	95	55	70	2.8	4.0	75	110
Miami silt loam, 12 to 20 percent slopes, eroded	55	85	45	60	2.0	3.5	60	100
Mifflin loam, 6 to 12 percent slopes, eroded	50	75	35	50	2.0	3.0	65	100
Mifflin loam, 12 to 20 percent slopes, eroded	40	65	30	45	1.5	2.5	50	80
Mifflin loam, shallow solum variant, 6 to 12 percent slopes, eroded	30	55	25	50	1.5	2.5	50	75
Mifflin loam, shallow solum variant, 12 to 20 percent slopes, eroded	------	------	20	40	1.0	1.8	40	60
Morley silt loam, 2 to 6 percent slopes, eroded	65	85	50	70	3.0	4.5	75	115
Morley silt loam, 6 to 12 percent slopes, eroded	55	75	40	60	2.5	4.0	70	110
Morley silt loam, 12 to 20 percent slopes, eroded	40	70	30	55	1.8	3.0	65	105
Muscatine silt loam, 2 to 6 percent slopes, eroded [2]	85	120	60	70	3.0	4.8	95	150

Footnotes at end of table.

TABLE 2.—*Estimated average yields per acre of principal crops grown under two levels of management*—Continued

Soil	Corn A	Corn B	Oats A	Oats B	Alfalfa-brome hay A	Alfalfa-brome hay B	Pasture A	Pasture B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Muscatine silt loam, benches, 0 to 3 percent slopes [2]	85	120	60	70	2.0	4.0	95	150
Muscatine silt loam, loamy substratum, 0 to 3 percent slopes [2]	85	120	60	70	2.0	4.0	95	150
Myrtle silt loam, 2 to 6 percent slopes, eroded	80	105	65	80	3.2	4.8	105	140
Myrtle silt loam, 6 to 12 percent slopes, eroded	70	95	55	75	2.5	3.8	90	130
Navan silt loam [2]	----	105	45	65	----	4.0	85	145
NewGlarus silt loam, 2 to 6 percent slopes, eroded	60	85	55	65	2.2	4.0	70	110
NewGlarus silt loam, 6 to 12 percent slopes, eroded	55	80	50	60	2.0	3.5	65	100
NewGlarus silt loam, 12 to 20 percent slopes, eroded	50	75	50	60	1.5	2.5	65	95
NewGlarus silt loam, 20 to 30 percent slopes, eroded	----	----	40	50	1.0	2.0	60	85
NewGlarus soils, 6 to 12 percent slopes, severely eroded	50	75	50	60	1.5	2.5	65	95
NewGlarus soils, 12 to 20 percent slopes, severely eroded	----	----	40	50	1.0	2.0	60	85
Northfield loam, 2 to 6 percent slopes, eroded	45	70	40	55	1.8	2.8	60	90
Northfield loam, 6 to 12 percent slopes, eroded	40	65	35	50	1.5	2.3	55	85
Northfield loam, 12 to 20 percent slopes, eroded	----	----	25	40	1.0	2.0	45	80
Northfield loam, 20 to 30 percent slopes, eroded	----	----	----	----	.8	1.3	35	70
Ockley loam, 0 to 2 percent slopes	60	95	55	70	2.7	4.2	70	115
Ockley loam, 2 to 6 percent slopes	55	90	50	70	2.3	4.0	65	110
Ockley sandy loam, 0 to 3 percent slopes	50	85	45	60	2.0	3.3	65	110
Ockley silt loam, 0 to 2 percent slopes	70	105	65	75	3.0	4.5	85	120
Ockley silt loam, 2 to 6 percent slopes, eroded	65	95	60	75	2.5	4.0	75	115
Ockley silt loam, 6 to 12 percent slopes, eroded	55	85	50	65	2.0	3.0	70	105
Ogle silt loam, 2 to 6 percent slopes, eroded	85	115	65	80	3.5	4.9	110	145
Ogle silt loam, 6 to 12 percent slopes, eroded	80	110	60	75	3.5	4.5	105	140
Orion silt loam, 0 to 3 percent slopes	65	100	45	65	2.0	4.0	90	145
Orion silt loam, wet variant [2]	----	----	----	----	----	----	85	120
Oshtemo loamy sand, 0 to 2 percent slopes	45	75	25	60	1.5	3.0	60	98
Oshtemo loamy sand, 2 to 6 percent slopes, eroded	40	60	30	45	1.3	2.3	55	90
Oshtemo loamy sand, 6 to 12 percent slopes, eroded	30	50	20	35	1.0	2.0	50	80
Ossian silt loam [2]	80	110	55	70	----	4.5	85	145
Otter silt loam [2]	75	110	45	65	----	4.0	95	150
Palms muck [2]	----	100	----	50	----	3.0	65	130
Palsgrove silt loam, 2 to 6 percent slopes, eroded	70	105	50	70	2.5	3.5	90	135
Palsgrove silt loam, 6 to 12 percent slopes, eroded	60	95	45	65	2.0	3.2	85	130
Palsgrove silt loam, 12 to 20 percent slopes, eroded	50	80	35	55	1.5	2.5	80	120
Palsgrove silty clay loam, 12 to 20 percent slopes, severely eroded	----	----	30	50	1.0	2.2	65	100
Pecatonica silt loam, 2 to 6 percent slopes, eroded	75	100	60	75	3.0	4.5	85	120
Pecatonica silt loam, 6 to 12 percent slopes, eroded	65	95	45	70	2.4	3.5	80	120
Pecatonica silt loam, 12 to 20 percent slopes, eroded	55	80	40	60	1.8	2.5	70	105
Pillot silt loam, 0 to 2 percent slopes	65	90	50	65	2.5	3.5	85	120
Pillot silt loam 2 to 6 percent slopes, eroded	60	85	45	65	2.2	3.4	75	115
Pillot silt loam, 6 to 12 percent slopes, eroded	50	75	40	55	1.7	3.0	65	100
Plainfield loamy sand, 0 to 6 percent slopes, eroded	30	45	25	35	1.2	2.3	40	60
Riverwash	----	----	----	----	----	----	----	----
Rockton loam, 6 to 12 percent slopes, eroded	50	80	40	50	1.5	2.8	70	105
Rockton loam, 12 to 20 percent slopes, eroded	45	70	35	45	1.0	2.3	60	90
Rockton silt loam, 2 to 6 percent slopes, eroded	60	90	50	60	2.0	3.5	80	115
Rockton silt loam, 6 to 12 percent slopes, eroded	55	85	45	55	1.7	3.0	75	110
Rodman gravelly loam, 2 to 12 percent slopes	----	----	----	----	1.2	1.6	40	60
Rodman gravelly loam, 12 to 30 percent slopes	----	----	----	----	.5	1.0	25	40
Saybrook silt loam, 2 to 6 percent slopes, eroded	85	110	65	80	3.0	4.8	90	130
Saybrook silt loam, 6 to 12 percent slopes, eroded	75	100	55	70	2.5	4.5	80	120
Saylesville silt loam, 2 to 6 percent slopes, eroded	65	100	45	70	2.6	4.1	75	125
Sebewa silt loam [2]	65	95	45	65	----	4.0	80	135
Shiffer loam, 0 to 3 percent slopes [2]	50	85	50	65	2.0	4.0	90	125
Sogn silt loam, 2 to 12 percent slopes	----	----	25	40	1.5	2.5	45	65
Sogn silt loam, 12 to 30 percent slopes	----	----	----	----	1.0	2.0	35	55
Steep stony and rocky land	----	----	----	----	----	----	40	65
Stronghurst silt loam, 2 to 6 percent slopes [2]	80	115	55	65	2.8	4.6	90	145
Stronghurst silt loam, benches, 0 to 3 percent slopes [2]	80	115	55	65	2.8	4.6	90	145
Stronghurst silt loam, loamy substratum, 0 to 3 percent slopes [2]	80	115	55	65	2.8	4.6	90	145
Sylvester silt loam, 2 to 6 percent slopes, eroded	65	90	60	75	2.8	3.8	65	120
Sylvester silt loam, 6 to 12 percent slopes, eroded	60	85	50	65	2.8	3.2	60	110
Tama silt loam, 2 to 6 percent slopes, eroded	85	125	60	75	3.0	4.8	100	145
Tama silt loam, 6 to 12 percent slopes, eroded	75	105	55	70	2.5	4.2	95	135
Tama silt loam, benches, 0 to 2 percent slopes	90	130	60	75	3.0	4.8	110	150
Tama silt loam, benches, 2 to 6 percent slopes	85	125	60	65	2.8	4.6	100	145

Footnotes at end of table

TABLE 2.—*Estimated average yields per acre of principal crops grown under two levels of management*—Continued

Soil	Corn		Oats		Alfalfa-brome hay		Pasture	
	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Tell silt loam, 0 to 2 percent slopes	60	85	60	75	3.0	4.8	80	115
Tell silt loam, 2 to 6 percent slopes, eroded	55	80	50	70	2.8	4.0	70	105
Tell silt loam, 6 to 12 percent slopes, eroded	50	75	45	55	2.5	3.5	60	95
Terrace escarpments							25	60
Thackery silt loam, 0 to 3 percent slopes [2]	55	95	50	65	2.0	4.0	90	135
Wallkill silt loam [2]	60	100	45	65		4.0	85	120
Westville loam, 6 to 12 percent slopes, eroded	50	80	45	60	1.5	2.7	65	100
Westville silt loam, 2 to 6 percent slopes, eroded	70	95	55	70	2.8	4.3	80	115
Westville silt loam, 6 to 12 percent slopes, eroded	60	85	50	65	2.0	3.0	75	110
Westville silt loam, 12 to 20 percent slopes, eroded	50	80	45	60	1.5	2.7	65	100
Whalan loam, 2 to 6 percent slopes, eroded	50	75	40	60	1.5	3.2	65	105
Whalan loam, 6 to 12 percent slopes, eroded	45	65	35	50	1.0	2.5	50	90
Whalan silt loam, 2 to 6 percent slopes, eroded	55	85	50	70	2.5	3.5	75	115
Whalan silt loam, 6 to 12 percent slopes, eroded	50	75	40	60	1.5	3.0	65	105
Whalan silt loam, 12 to 20 percent slopes, eroded	45	65	35	50	1.0	2.5	50	90
Winnebago silt loam, 2 to 6 percent slopes, eroded	75	105	55	80	2.8	4.8	85	120
Winnebago silt loam, 6 to 12 percent slopes, eroded	65	95	50	75	2.2	4.8	75	110

[1] Cow-acre-days refers to the number of days 1 cow can graze 1 acre without injury to the sod during a single grazing season.

[2] Soils must be adequately drained and protected from overflow before maximum yields can be obtained.

Woodland [3]

Before Green County was settled and cleared, two-thirds of its land area was wooded. Most of the trees were red oak, black oak, white oak, and bur oak. A considerable part of this wooded area was open-grown or grove-type oak intermingled with native prairie grasses.

Clearing of the soils for farming began about 1840. With the clearing came wildfire and openings in the wooded areas. Young oak and other hardwoods, including sugar maple, basswood, and elm, sprang up in the openings.

Today only about 7 percent of the county is in trees. The most common species are red oak and white oak, hickory, sugar maple, basswood, and elm. Most of the remaining wooded areas are in the northwestern part of the county on narrow ridges and steep slopes that are poorly suited to farming.

About half of the present wooded areas are heavily grazed, generally by dairy cattle. Nearly half of the total acreage in trees is poorly stocked with good timber species, and most of it is poorly suited to tree planting. The present stands can be improved by management, by protection from grazing, and by improvement of harvest methods.

The most important wood products of the county are sawlogs, railroad ties, and fence posts. Minor products are veneer logs, stave bolts, and wood for fuel.

Woodland groups

To aid the landowner in planning woodland practices, the soils of Green County are placed in woodland groups. The soils in each group are similar in those characteristics that affect species suitability and growth, forest management, and timber harvesting.

The tree-growth potential for a soil group is given as the site index for the soils sampled. Site index is the expected height of dominant or codominant trees in the stand at the age of 50 years, with the exception of cottonwood, the site index for which is based on height at 30 years of age (an exception to the rule for tree species in Wisconsin). The site indices in this survey are estimated from actual measurements taken on tree plots in Green County or in nearby counties in Wisconsin.

Included as part of the descriptions of soil groups are ratings of hazards to woodland management that are directly related to the soil and to relief. Factors rated for potential hazard are seedling mortality or establishment, plant competition, equipment limitations, soil-related disease, windthrow, and erosion. If a hazard is slight or nonexistent, it is not discussed in this survey. Woodland groups are given for each mapping unit in the unit descriptions and in the "Guide to Mapping Units" at the end of the survey.

WOODLAND GROUP 1

Soils in this group are in the Arenzville, Arland, warm variant, Cadiz, Chaseburg, Dodge, Downs, Fayette, Flagg, Fox, Gale, Hebron, Hixton, Juda, Meridian, Miami, Mifflin, Myrtle, NewGlarus, Ockley, Palsgrove, Pecatonica, Tell, Westville, and Whalan series. They are moderately deep or deep, nearly level to steep, well-drained loams and silt loams. These soils are on uplands and valley benches. The total acreage in woodland is small because of a growing demand for farmland.

Available water capacity is medium to high in soils of this group. The soils have ample depth for root penetration.

The best sites for trees in Green County are on soils in this group. The site index for red oak ranges from 48 to

[3] This section was prepared by ROBERT E. GREENLAW and GEORGE W. ALLEY, woodland conservationists, Soil Conservation Service.

82, but it generally is around 60 and averages 57. The site index for sugar maple ranges from 52 to 71 and averages 63. The site indices for four stands of white ash ranged from 72 to 80 and averaged 77. Black walnut, black cherry, and basswood grow well on soils in this group. Recent effective management practices have made these soils the best suited of all soils in the county for the culture of walnut trees.

The hazard of competition from plants in the establishment and survival of trees is moderate to severe. The hazard of erosion is moderate to severe on steeper slopes, and the hazard of damage to equipment on these slopes is also moderate to severe. Red pine and white pine are suitable trees for reforestation. These trees, combined in a stand with Norway spruce, white spruce, and northern white cedar, are well suited as windbreaks.

WOODLAND GROUP 2

In this group are deep, moderately well drained and well drained soils in the Morley and Saylesville series. They are in old lakebeds, on valley benches, or on glaciated uplands. The subsoil is clayey. Much of the acreage of soils in this group is now farmed.

Available water capacity is high in these soils, but the heavy subsoil limits the effective rooting depth.

No site-index measurements have been made on trees in Saylesville soils, but measurements made on similar soils in nearby areas have shown the approximate site index for red oak ranges from 50 to 60.

Plant competition is severe. Windthrow hazard, because of the shallow rooting depth, is moderate. Frost heave presents a severe hazard to young trees. Equipment limitations are severe, and logging and other mechanized operations are limited to dry or frozen periods. Machine planting of trees in spring may be difficult.

The native vegetation on soils of this group was mixed hardwoods, but white pine and white spruce are suited to planting for reforestation or for windbreaks.

WOODLAND GROUP 3

In this group are the land type Terrace escarpments and soils in the Billett, Dickinson, Eleva, Fox, Lindstrom, and Ockley series. These soils and land types are deep and moderately deep, well-drained and somewhat excessively drained sandy loams. They are on valley benches and slopes.

Available water capacity is low or moderate, and fertility is low to high.

The measured site index for trees on soils in this group is variable. The site index for red oak is usually less than 50, but the site indices for red pine and white pine range from 65 to 75.

Plant competition for the establishment and survival of trees is moderate to severe because of the moderate or low available water capacity of the surface layer. The hazard of damage to equipment and the hazard of erosion are moderate to severe where slopes are steep.

The native vegetation on soils of this group is hardwoods, such as oak and hickory. Red pine and white pine are suitable for planting except in areas of severely eroded soils. Jack pine is better suited in those areas.

WOODLAND GROUP 4

This group consists of well-drained to excessively drained soils in the Boone, Gotham, Oshtemo, and Plainfield series. They are on glacial outwash plains and valley slopes.

The measured site index for oak on these soils ranges from 39 to 64, and the average is 55. The site index for jack pine ranges from 54 to 66 and averages 59. The only plot of red pine measured had a site index of 65, and the range for white pine is from 53 to 65, averaging 59. Plot data taken on red pine and white pine indicate a site index that is frequently more than 80, but these data may not be reliable, because plantations available for measurement may have been too young to express true site potential. Most such plantations in Wisconsin are less than 25 years old.

The hazard to seedling survival is severe in these soils because of droughtiness resulting from low to very low available water capacity. The hazard of damage to equipment and the hazard of erosion are severe in steeply sloping areas. Soil blowing is a hazard in unvegetated areas.

The native vegetation is dominantly red oak, black oak, bur oak, white oak, or northern pin oak. Ground cover before the soils were cultivated was prairie grasses. Species suitable for planting on better sites are red pine and white pine, but jack pine is better suited to poorer sites.

WOODLAND GROUP 5

Soils in this group are in the Dunbarton, Edmund, Elkmound, Mifflin, shallow solum variant, NewGlarus, and Northfield series. These soils are gently sloping to steep, well-drained and somewhat excessively drained loams and silts on uplands. They are 12 to 24 inches deep.

The site index for red oak, based on measurements taken from four plots in the county, ranges from 60 to 74 and averages 66. Site indices for other hardwoods, based on scattered data, range from 57 to 74.

The hazard to the establishment and survival of seedlings is moderate to severe because available water capacity is low and moderate. Windthrow hazard is moderate to severe because of limited rooting depth. The hazard of damage to equipment and the hazard of erosion are severe in areas of steeply sloping soils.

Hardwoods, dominantly oak and hickory, are native to soils of this group. White pine and red pine are suitable for planting. White pine is better suited to areas on north- and east-facing slopes and in areas of deeper soil.

WOODLAND GROUP 6

This group consists of soils in the Dunbarton, Rodman, and Sogn series. These are very shallow and shallow, sloping to steep soils on ridges and side slopes of uplands. Depth to gravel or bedrock is less than 12 inches.

The soils of this group are poor as tree sites because of their shallow root zone. Since the population of measurable trees is small, measurements for site index have not been made. An estimated average site index for upland oak, the predominant native tree, is less than 50.

Eastern redcedar is native to soils of this group. It can be used for windbreaks or for wildlife habitat. The estimated growth for this tree is less than 1 foot per year.

The hazard of seedling mortality is severe because of the low available water capacity. Windthrow is a severe

hazard because of the limited rooting depth. This hazard is offset to a degree by the characteristics of the taproot of native trees. On steep slopes the hazard of erosion and the hazard of damage to equipment are severe.

WOODLAND GROUP 7

In this group are soils of the Brookston, Colwood, Dells, Del Rey, Ettrick, Hebron, mottled subsoil variant, Lamartine, Lawler, Marshan, Matherton, Muscatine, Navan, Ossian, Sebewa, Shiffer, Stronghurst, and Thackery series. These are nearly level, somewhat poorly drained to very poorly drained soils on uplands and in valleys and depressions. Ground water is at a depth of about 1 to 3 feet during wet periods.

Native vegetation on the somewhat poorly drained soils is mixed hardwoods, including red oak, white ash, sugar maple, soft maple, and elm. The poorly drained soils support native stands of elm, ash, and soft maple.

Data on site indices are scarce for soils in this group, probably because only a few stands are suitable for measurement. Two stands of soft maple had site indices of 71 and 78, however; one stand of red oak had a site index of 80; and one stand of aspen had a site index of 84. Most acreage is used for crops. Good growth can be expected on soils in this group because available water capacity is high and fertility is fair to good. Growth potential is lower for very poorly drained soils than for soils that are not so wet.

Hazards that limit growth and establishment of trees are severe for soils of this group. Competition from weeds, grass, and brush is a severe hazard, and danger of mortality because of excess water is a hazard in low areas. Rotting of roots and contracting of diseases associated with wet soils are common in low areas. The hazard of windthrow is severe in areas where the water table is high. Use of equipment is severely limited, especially in areas of poorly drained soils; and planting by machine in areas of poorly drained soils is difficult.

WOODLAND GROUP 8

Maumee sandy loam is the only soil in this group. This soil is on outwash plains and valley benches. It is poorly drained, and ground water is at or near the surface during wet periods.

Native trees on this soil are willow, elm, and soft maple. No data on site indices are available for these species, but data from nearby counties show indices of about 50 for pine, 54 for red oak, and 87 for aspen.

The hazard of seedling mortality because of wetness and plant competition is severe. The hazard of damage to equipment generally is moderate on soils in this group, but in spring it is severe in places during the tree-planting season. The windthrow hazard is moderate. The hazard of soil-related disease, root rot, and butt rot is moderate in wet areas.

White pine, white spruce, northern white cedar, and soft maple are suitable species for planting.

WOODLAND GROUP 9

This group consists of the land types Alluvial land and Alluvial land, wet, and soils in the Orion, Orion, wet variant, Otter, and Wallkill series. These somewhat poorly drained and poorly drained soils formed in alluvium and on flood plains. During wet periods ground water is at a depth of less than 1 foot to about 3 feet.

All trees on these soils grow rapidly. Limited plot data indicate a site index of 65 for white ash and 91 for soft maple. A site index of 83 for cottonwood is determined to a base age of 30 years. Trees on the more poorly drained soils have much lower growth potential.

Plant competition and the hazard of loss of seedlings because of wetness are severe. Windthrow hazard is likely to be severe because of a high water table that limits the depth of root penetration. Equipment limitations are severe. Mechanical planting is difficult or impossible, and harvesting usually must be done in dry or frozen periods. Soil-associated root rots and related diseases are moderate to severe hazards to stands of trees on soils in this group.

Native to these soils are elm, ash, soft maple, willow, and, occasionally, cottonwood. Cottonwood and soft maple are suitable for planting, which usually must be done by hand.

WOODLAND GROUP 10

In this group are organic soils, mucks, and peats in the Adrian, Houghton, and Palms series. These soils are in such low, marshy areas as filled-in lakes and ponds in which ground water is at or near the surface during wet periods.

Growth potential for trees on these soils is usually low. The site index for elm is as low as 47, but the site index for soft maple is as high as 65. This variation is often related to the drainage characteristics of the soil.

Plant competition and the hazard of loss of seedlings because of wetness are severe. The hazards of windthrow and damage to equipment are severe. When soils of this group are dry, they are subject to burning and to soil blowing. Soil-related root and stem rots and similar diseases are a severe hazard.

These soils are used more often for wildlife habitat than for growing trees. Native to these soils are willow, sedge, and other marsh plants and, occasionally, such hardwoods as ash and elm. The soils generally are not suited to trees except in drained areas in which windbreaks are needed to protect soils planted to farm crops, usually vegetables. Many species grow well in such drained areas. Laurel willow and green willow are most commonly grown as windbreaks, although recent disease damage in windbreaks of these trees has been very severe in southern and central Wisconsin. Some hybrid poplars grow well as windbreaks in muck. Lilac, cotoneaster, buffaloberry, and Manchurian crabapple are also satisfactory in windbreaks.

WOODLAND GROUP 11

This group consists only of the land type Riverwash. The only trees on this land type are scattered willows. No other trees are suited. Planted willows control erosion and stabilize banks. The hazards of seedling mortality, erosion, windthrow, and damage to equipment are very severe.

WOODLAND GROUP 12

Soils in this group are in the Ashdale, Dakota, Dodgeville, Durand, Griswold, Huntsville, Lindstrom, Ogle, Pillot, Rockton, Saybrook, Sylvester, Tama, and Winnebago series. These loamy prairie soils are in the central and southern parts of the county.

No site-index measurements were possible, because most of these soils are farmed and do not presently support trees. The potential for tree growth on prairie soils, however, is usually low.

Trees are seldom planted except in windbreaks. Among the trees that have been successfully established in windbreaks are Norway spruce, Black Hills spruce, white spruce, northern white cedar, white pine, and eastern redcedar.

Native vegetation on these soils is prairie grasses and open-growth oak. As farming spread and wildfire was controlled, oak openings on the fringe of the prairie became filled with stands of red oak, black oak, white oak, bur oak, and eastern redcedar.

WOODLAND GROUP 13

This group consists only of the land type Steep stony and rocky land. The potential for tree growth varies widely from place to place. Some small bench areas are made up of deep, productive soils. Other areas are too shallow and too stony for trees. The site index for black oak is 54; for bur oak, 32; and for red pine, 27.

Seedling mortality is high because of droughtiness. Windthrow hazard is severe because of limited rooting depth. The hazard of damage to equipment and the hazard of erosion are severe because of steepness.

Native to these soils on the cooler, more moist east- and north-facing slopes are the northern hardwoods oak, maple, basswood, and ash. Oak, hickory, and eastern redcedar are native in grassed areas on the hotter, drier south- and west-facing slopes. Trees must be planted by hand. White pine and red pine are best suited to planting on the cooler north- and east-facing slopes. On the south- and west-facing slopes, only eastern redcedar can be expected to survive after planting.

Yields in table 3 are expressed as gross board feet (Scribner rule). They represent average annual production based on full stocking with enough trees to fully utilize the site, making no deduction for cull or defect. Material cut in thinning is included in the productivity figures. These yields, based on intensive management and harvest at optimum age, reflect maximum potential productivity under our current concept of good management. Unmanaged stands rarely attain this maximum because of cull, mortality, and improper stocking.

The site index for trees on many of these soils was determined from measurements made by a team of foresters and soil scientists working together. Site index is the average height of the dominant trees in a stand at age 50, and it is considered to be one of the best indicators of potential soil productivity. If wooded sites suitable for measurement were not available for a soil, similar soils were used for comparison. In most instances, site indexes are shown with the normal range that might be expected in a group of soils. These figures, applied to the most accurate available normal yield tables supplied by research data from woodland conservationists, have been used to predict productivity.

TABLE 3.—*Predicted annual yields per acre of usable timber from well-managed, high-density stands*

[An asterisk in the first column indicates that one mapping unit in this series is made up of two or more kinds of soil. For this reason the reader should follow carefully the instructions for referring to another series in the first column of this table. Absence of data indicates that the soil is not suited to trees or that trees are not ordinarily grown on the soil]

Soil series and map symbols	Woodland group	Cool sites [1]		Hot sites [2]	
		Hardwoods	Conifers [3]	Hardwoods	Conifers [3]
		Board feet [4]	*Board feet* [4]	*Board feet* [4]	*Board feet* [4]
Adrian: Ac	10	100			
Alluvial land: Ad	9	150			
Alluvial land, wet: Ae	9	150			
Arenzville: An	1	275	300		
Arland: ArB2, ArC2, ArD2	1	150	300	100	250
Ashdale: AsB2, AsC2, AsD2	12				
Billett: BlA, BlB2, BlC2	3	150	400		
Boone: BoD	4	75	400	50	300
Brookston: Br	7	100			
Cadiz: CdB2, CdC2	1	150	300	125	250
*Chaseburg: ChB, ChC, Cn	1	275	300		
For Arenzville part of Cn, see Arenzville series.					
Colwood: Co	7	150			
Dakota: DaA, DaB2	3		450		
Dells: DbA	7	150			
Del Rey: Dc	7	200	400		
Dickinson: DdA	3		450		
Dodge: DeB2, DeC2	1	110	300	100	200
Dodgeville: DgB2, DgC2, DgC3, DgD2	12				
Downs:					
DoB2, DoC2	1	200	300	175	250
DsA, DsB, DsB2, DsC2	1	200	300		
Dunbarton:					
DuB2, DuC2, DuD2, DuE2	5	100		100	
DvD3	6	50	50		50

See footnotes at end of table.

TABLE 3.—*Predicted annual yields per acre of usable timber from well-managed, high-density stands*—Continued

Soil series and map symbols	Woodland group	Cool sites [1]		Hot sites [2]	
		Hardwoods	Conifers [3]	Hardwoods	Conifers [3]
		Board feet [4]	*Board feet* [4]	*Board feet* [4]	*Board feet* [4]
Durand: DwB2, DwC2	12				
Edmund: EdB2, EdC2, EdD2	12				
Eleva: EeC2, EeD2	13	100	450	75	480
Elkmound: ElB2, ElC2, ElD2, ElE2, ElF	5	100	300	50	250
Ettrick: Et	7	100			
Fayette:					
FaB2, FaC2, FaD2, FcB2, FcC2, FcD2	1	250	300	150	250
FbA, FbB2, FbC	1	250	300		
FeC2, FeD2	1	275	300	250	250
Flagg: FlA, FlB2, FlC2	1	275	300	250	250
Fox:					
FnC2, FnD2	3	100	350		
FoA, FoB2, FoC2	1	140	350		
FsA, FsB2	1	150	350		
Gale: GaB2, GaC2, GaD2, GaE2	1	125	450	100	350
Gotham: GoA, GoB2, GoC2	4	100	350		300
Griswold: GrB2, GrC2	12				
Hebron:					
HbA, HbB2	1	150	400		
HeA	7	150			
Hixton: HmB2, HmC2	3	100	450	75	400
Houghton: Hu	10	100			
Huntsville: HvA, HvB	12				
Juda: JuB2, JuC2	1	150	300		
Lamartine: LaB	7	150	400		
Lawler: LeA, LlA	12				
Lindstrom:					
LnC2, LnD2	3		400		350
LsC, LsD2	12				
Marshan: Mb, Mc	7				
Matherton: Md	7	150	300		
Maumee: Me	8	150			
Meridian: MlA, MlB2, MlC2	3	150	400		
Miami: MmB2, MmC2, MmD2	1	175	300		
Mifflin:					
MnC2, MnD2	1	150	300	100	250
MoC2, MoD2	5	100		100	
Morley: MrB2, MrC2, MrD2	1	150	300	125	250
Muscatine: MsB2, MtA, MuA	12				
Myrtle: MyB2, MyC2	1	275	300		
Navan: Na	7				
New Glarus:					
NgB2, NgC2, NgD2, NgE2	1	150	300	150	200
NlC3, NlD3	5	100		75	
Northfield: NoB2, NoC2, NoD2, NoE2	5	100	300	75	250
Ockley:					
OcA	3	150	350		
OeA, OeB	1	275	300		
OkA, OkB2, OkC2	1	250	400		
Ogle: OlB2, OlC2	12				
Orion:					
OnA	9	200			
Or	9	100			

See footnotes at end of table.

TABLE 3.—*Predicted annual yields per acre of usable timber from well-managed, high-density stands*—Continued

Soil series and map symbols	Woodland group	Cool sites [1]		Hot sites [2]	
		Hardwoods	Conifers [3]	Hardwoods	Conifers [3]
		Board feet [4]	*Board feet* [4]	*Board feet* [4]	*Board feet* [4]
Oshtemo: OsA, OsB2, OsC2	4	100	350		
Ossian: Ot	7				
Otter: Ou	12				
Palms: Pa	10	100			
Palsgrove:					
PgB2, PgC2, PgD2	1	175	300	150	250
PlD3	1	150	250	125	225
Pecatonica: PnB2, PnC2, PnD2	1	175	300	150	250
Pillot: PoA, PoB2, PoC2	12				
Plainfield: PrB2	4	50	400		
Riverwash: Rh	11				
Rockton: RkC2, RkD2, RnB2, RnC2	12				
Rodman: RoC, RoE	6	50	50		50
Saybrook: SaB2, SaC2	12				
Saylesville: ScB2	2	250	400		
Sebewa: Se	7				
Shiffer: SfA	7	150			
Sogn: SoC, SoE	6				
Steep stony and rocky land: Sp	13	250		50	
Stronghurst: SsB, StA, SuA	7	150			
Sylvester: SyB2, SyC2	12				
Tama: TaB2, TaC2, TbA, TbB	12				
Tell: TcA, TcB2, TcC2	1	200	350		
Terrace escarpments: Te	3	150	350	50	200
Thackery: ThA	7	150			
Wallkill: Wa	9	200			
Westville: WdC2, WeB2, WeC2, WeD2	1	250	350	150	250
Whalan: WhB2, WhC2, WlB2, WlC2, WlD2	1	125	200	100	150
Winnebago: WnB2, WnC2	12				

[1] Cool sites are north- and east-facing slopes, coves, and narrow valleys protected from hot and drying winds.

[2] Hot sites are south- and west-facing slopes and exposed ridgetops where soils are exposed to high temperatures and drying winds.

[3] Conifer yields are given for pine plantations unless otherwise specified.

[4] Board feet are according to Scribner decimal C log rule. Yields of about 50 board feet or less are generally harvested as cordwood because size and quality preclude use of the trees for saw logs. One cord equals about 500 board feet.

Use of the Soils for Wildlife

Each kind of soil in Green County will produce various amounts and kinds of vegetation used by wildlife for food, cover, and nesting. Pheasants, for example, can thrive in intensively farmed areas if cover is available. Some of the largest pheasant populations in the State are in the heavily farmed areas south of Monroe, west of Oakley, and east of Martintown. Squirrels, however, require large wooded lots that have a good supply of large nut trees which supply food, cover, and sites for nesting.

Proper land management can supply essential elements that are missing from a particular area (fig. 10). Of primary importance are the poorly drained soils of the wetlands. Besides supplying food, cover, and water, they are the last refuge from man available to wildlife. Also important are the large, wooded areas that still remain in the county. These areas provide an undisturbed area for large wildlife populations, which in turn provide individuals to populate newly established wildlife areas. Other productive areas are stone and brush piles, uncut fence rows, odd corners of fields that are left idle, and small potholes that impound water.

In table 4 the soils of the county are rated according to their limitations for producing various elements of wildlife habitat. Each soil group has been given a rating of *good*, *fair*, *poor*, or *unsuitable* for each of seven habitat elements. These elements are grain and seed crops, grasses and legumes, wild herbaceous upland plants, hardwood trees and shrubs, coniferous trees, wetland food and cover plants, and shallow- and deep-water developments.

Suitability of the soil for grain and seed crops and for grasses and legumes is based on the ability of the soil to produce sufficient food and cover for wildlife needs. Yields are not significant in areas in which they exceed the requirements for good wildlife habitat.

Wild herbaceous upland plants are naturally established grasses and forbs that can be used for food and cover for some species of wildlife. A wide variety of plants is desirable.

Figure 10.—**Landscape showing good cover and escape areas provided by pines planted in Tell and Northfield soils.**

Hardwood trees and shrubs include trees, shrubs, and woody vines that produce food for wildlife in the form of fruit, nuts, buds, twigs, and foliage.

Coniferous trees include cone-bearing trees that are used mainly for cover by wildlife but that furnish some food in the form of browse, seeds, or fruitlike cones.

Wetland food and cover plants are those that grow well in wet areas and that furnish food and cover for wildlife that inhabit these areas.

Shallow- and deep-water developments include impoundments or excavations that provide areas for waterfowl and animals that require a water habitat. Soils that have a year-round high water table generally have slight limitations for this habitat element.

Cover and food can be provided for wildlife by: (1) leaving fence rows, roadsides, odd areas, or sloughs uncut and unburned; (2) planting low-growing shrubs along permanent fences and maintaining existing shrubs on upland soils; (3) excluding livestock from abandoned land, odd corners of fields, and idle areas of at least one-fourth acre; (4) planting and maintaining evergreens and shrubs in a rod-wide border between woods and fields; (5) leaving ponds and depressed areas that are suitable for wildlife undrained; and (6) improving marshy areas by providing level ditches or by otherwise controlling the level of the water.

The four degrees of suitability are defined as follows: *good* indicates that the soils have no limitations or that limitations for a given use are easy to overcome; *fair* indicates that the soils have limitations for a given use that can be overcome by average management and manipulation; *poor* indicates that the soils have limitations for a given use that are difficult to overcome; and *unsuitable* indicates that the soils have limitations that generally preclude their use for a given purpose.

Table 5 shows the relative importance of various wildlife habitat to specific kinds of wildlife.

For purposes of classification according to suitability for wildlife and wildlife habitat elements, the soils in Green County are grouped in the following manner:

Group 1.—Well drained and moderately well drained soils that are loamy throughout and not subject to flooding. Included in this group are the land type Terrace escarpments and soils of the Arland, warm variant, Ashdale, Billett, Dodge, Downs, Eleva, Fayette, Flagg, Fox, Gale, Hixton, Juda, Meridian, Miami, Mifflin, Myrtle, NewGlarus, Ockley, Palsgrove, Pecatonica, Tell, Westville, and Whalan series.

Group 2.—Well drained and moderately well drained soils that have a clayey subsoil. In this group are soils of the Cadiz, Downs, Hebron, Morley, and Saylesville series.

Group 3.—Excessively drained soils that are sandy throughout and soils that have a shallow rooting depth. Included in this group are soils of the Boone, Dunbarton, Edmund, Elkmound, Gotham, Mifflin, shallow solum variant, Northfield, Oshtemo, and Plainfield series.

Group 4.—Well drained and moderately well drained soils that have a thick, dark surface layer and are loamy throughout. In this group are soils of the Dakota, Dickinson, Dodgeville, Durand, Griswold, Lindstrom, Ogle, Pillot, Rockton, Saybrook, Sylvester, Tama, and Winnebago series.

Group 5a.—Somewhat poorly drained soils. In this group are soils of the Dells, Del Rey, Hebron, mottled subsoil variant, Lamartine, Lawler, Matherton, Muscatine, Orion, Shiffer, Stronghurst, and Thackery series.

Group 5b.—Poorly drained soils. Included in this group are the land type Alluvial land, wet, and soils of the Brookston, Colwood, Ettrick, Marshan, Maumee, Navan, Orion, wet variant, Ossian, Otter, Sebewa, and Wallkill series.

Group 6.—Organic soils. In this group are soils of the Adrian, Houghton, and Palms series.

Group 7.—Well drained and moderately well drained soils that are subject to flooding. In this group are the land type Alluvial land and soils of the Arenzville, Chaseburg, and Huntsville series.

Group 8.—Thin, droughty or stony and rocky land types and very shallow soils. In this group are the land types Riverwash and Steep stony and rocky land and soils of the Rodman and Sogn series.

Engineering Uses of the Soils[4]

This section is useful to those who need information about soils used as structural material or as foundation

[4] ROBERT C. BINTZLER, assistant State conservation engineer, Soil Conservation Service, assisted in preparing this section.

upon which structures are built. Some of those who can benefit from this section are planning commissions, town and city managers, land developers, engineers, contractors, and farmers.

Among properties of soils highly important in engineering are permeability, strength, compaction characteristics, drainage, shrink-swell potential, grain size, plasticity, and reaction. Also important are slope, and depth to the water table and to bedrock. These properties, in various degrees and combinations, affect construction and maintenance of roads, airports, pipelines, foundations for small buildings, irrigation systems, ponds and small dams, and systems for disposal of sewage and refuse.

Information in this section of the soil survey can be helpful to those who—

1. Select potential residental, industrial, commercial, and recreational sites.
2. Evaluate alternate routes for roads, highways, pipelines, and underground cables.
3. Seek sources of gravel, sand, or clay.
4. Plan farm drainage systems, irrigation systems, ponds, terraces, and other structures for controlling water and conserving soil.
5. Correlate performance of structures already built with properties of the kinds of soil on which they are built, for the purpose of predicting performance of structures on the same or similar kinds of soils in other locations.
6. Predict the trafficability of soils for cross-country movement of vehicles and construction equipment.
7. Develop preliminary estimates pertinent to construction in a particular area.

Most of the information in this section is presented in tables 6, 7, 8, and 9, which show, respectively, several estimates of soil properties significant in engineering; interpretations for various engineering uses; and results of engineering laboratory tests on soil samples. This information, along with the soil map and other parts of this publication, can be used to make interpretations in addition to those given in tables 6, 7, 8, and 9. It also can be used to make other useful maps.

The engineering interpretations reported here do not eliminate the need for sampling and testing at the site of specific engineering works involving heavy loads and where the excavations are deeper than the depths of layers here reported. Estimates generally are made to a depth of about 5 feet and interpretations do not apply to greater depths. Also, engineers should not apply specific values to the estimates for bearing capacity and traffic-supporting capacity given in this survey. Investigation of each site is needed because many delineated areas of a given soil mapping unit may contain small areas of other kinds of soil that have strongly contrasting properties and different suitabilities or limitations for soil engineering. Even in these situations, however, the soil map is useful in planning more detailed field investigations and for indicating the kinds of problems that may be expected.

Some of the terms used in this soil survey have special meaning to soil scientists and are not known to all engineers. Many of the terms commonly used in soil science are defined in the Glossary at the back of this survey.

Engineering Classification Systems

The two systems most commonly used in classifying samples of soils for engineering are the Unified system (*7*) used by the SCS engineers, Department of Defense, and others, and the AASHO system (*1*) adopted by the American Association of State Highway Officials.

In the Unified system soils are classified according to particle-size distribution, plasticity, liquid limit, and organic matter. Soils are grouped in 15 classes. There are eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes are designated by symbols for both classes; for example, ML–CL.

The AASHO system is used to classify soils according to those properties that affect use in highway construction and maintenance. In this system, a soil is placed in one of seven basic groups ranging from A–1 through A–7 on the basis of grain-size distribution, liquid limit, and plasticity index. In group A–1 are gravelly soils of high bearing strength, or the best soils for subgrade (foundation). At the other extreme, in group A–7, are clay soils that have low strength when wet and that are the poorest soils for subgrade. Where laboratory data are available to justify a further breakdown, the A–1, A–2, and A–7 groups are divided as follows: A–1–a, A–1–b, A–2–4, A–2–5, A–2–6, A–2–7, A–7–5, and A–7–6. As additional refinement, the engineering value of a soil material can be indicated by a group index number. Group indexes range from 0 for the best material to 20 or more for the poorest. The AASHO classification for tested soils, with group index numbers in parentheses, is shown in table 9; the estimated classification, without group index numbers, is given in table 6 for all soils mapped in the survey area.

Soil scientists use the USDA textural classification (*6*). In this, the texture of the soil is determined according to the proportion of soil particles smaller than 2 millimeters in diameter, that is, the proportions of sand, silt, and clay.

Table 9 shows the AASHO and Unified classification of specified soils in the county, as determined by laboratory tests. Table 6 shows the estimated classification of all the soils in the county according to all three systems of classification.

Engineering Test Data

A summary of engineering test data on soil samples, representing 12 soil series and taken from 30 profiles in the county, is given in table 9. The data furnished in this table are the results of tests made by the State Highway Commission of Wisconsin under a cooperative agreement with the U.S. Department of Commerce, Bureau of Public Roads. Tests were made in accordance with standard procedures of the American Association of State Highway Officials.

The soil samples were taken from major horizons of the soils at representative sites. For some of the soils, not all of the major horizons were sampled, and for these the data are only for the particular horizon sampled.

TABLE 4.—*Suitability of soils for*

Wildlife group, soil series, and map symbols	Elements of wildlife habitat: Grain and seed crops	Elements of wildlife habitat: Grasses and legumes
Group 1 Arland (ArB2, ArC2, ArD2). Ashdale (AsB2, AsC2, AsD2). Billett (BlA. BlB2, BlC2). Dodge (DeB2, DeC2). Downs (DoB2, DoC2). Eleva (EeC2, EeD2). Fayette (FaB2, FaC2, FaD2, FbA, FbB2, FbC, FcB2, FcC2, FcD2, FeC2, FeD2). Flagg (FlA, FlB2, FlC2). Fox (FnC2, FnD2, FoA, FoB2, FoC2, FsA, FsB2). Gale (GaB2, GaC2, GaD2, GaE2). Hixton (HmB2, HmC2). Juda (JuB2, JuC2). Meridian (MlA, MlB2, MlC2). Miami (MmB2, MmC2, MmD2). Mifflin (MnC2, MnD2). Myrtle (MyB2, MyC2). NewGlarus (NgB2, NgC2, NgD2, NgE2, NlC3, NlD3). Ockley (OcA, OeA, OeB, OkA, OkB2, OkC2). Palsgrove (PgB2, PgC2, PgD2, PlD3). Pecatonica (PnB2, PnC2, PnD2). Tell (TcA, TcB2, TcC2). Terrace escarpments (Te). Westville (WdC2, WeB2, WeC2, WeD2). Whalan (WhB2, WhC2, WlB2, WlC2, WlD2)	Good on 0 to 6 percent slopes, fair on 6 to 12 percent slopes, and unsuitable on steeper slopes; hazard of water erosion.	Good on 0 to 12 percent slopes, fair on 12 to 20 percent slopes, and poor on steeper slopes.
Group 2 Cadiz (CdB2, CdC2) Downs (DsA, DsB, DsB2, DsC2) Hebron (HbA, HbB2). Morley (MrB2, MrC2, MrD2). Saylesville (ScB2).	Good on 0 to 6 percent slopes, fair on 6 to 12 percent slopes, and unsuitable on steeper slopes.	Good on 0 to 12 percent slopes and poor on steeper slopes.
Group 3 Boone (BoD). Dunbarton (DuB2, DuC2, DuD2, DuE2, DvD3). Edmund (EdB2, EdC2, EdD2). Elkmound (ElB2, ElC2, ElD2, ElE2, ElF). Gotham (GoA, GoB2, GoC2). Mifflin (MoC2, MoD2). Northfield (NoB2, NoC2, NoD2, NoE2). Oshtemo (OsA, OsB2, OsC2). Plainfield (PrB2).	Fair on 0 to 6 percent slopes and poor on steeper slopes; hazard of water erosion.	Fair on 0 to 12 percent slopes and poor on steeper slopes.
Group 4 Dakota (DaA, DaB2). Dickinson (DdA). Dodgeville (DgB2, DgC2, DgC3, DgD2). Durand (DwB2, DwC2). Griswold (GrB2, GrC2). Lindstrom (LnC2, LnD2, LsC, LsD2). Ogle (OlB2, OlC2). Pillot (PoA, PoB2, PoC2). Rockton (RkC2, RkD2, RnB2, RnC2). Saybrook (SaB2, SaC2). Sylvester (SyB2, SyC2). Tama (TaB2, TaC2, TbA, TbB). Winnebago (WnB2, WnC2).	Good on 0 to 6 percent slopes, fair on 6 to 12 percent slopes, and poor on steeper slopes; hazard of water erosion.	Good on 0 to 12 percent slopes and poor on steeper slopes.

elements of wildlife habitat

Elements of wildlife habitat—Continued				
Wild herbaceous upland plants	Hardwood trees and shrubs	Coniferous trees	Wetland food and cover plants	Shallow- and deep-water developments
Good	Good	Good	Poor on 0 to 2 percent slopes and unsuitable on steeper slopes; few species suited.	Poor on 0 to 2 percent slopes and unsuitable on steeper slopes; moderate permeability.
Good	Good	Good	Poor on 0 to 2 percent slopes and unsuitable on steeper slopes; few species suited.	Fair on 0 to 2 percent slopes and unsuitable on steeper slopes.
Fair on 0 to 20 percent slopes and poor on steeper slopes.	Fair: not all species suited.	Fair: low available water capacity.	Poor on 0 to 2 percent slopes and unsuitable on steeper slopes; few species suited.	Unsuitable: shallow to very porous substratum or bedrock.
Good	Fair: competition from grass.	Fair: competition from grass.	Poor on 0 to 2 percent slopes and unsuitable on steeper slopes; few species suited.	Poor on 0 to 2 percent slopes and unsuitable on steeper slopes; moderate permeability.

TABLE 4.—*Suitability of soils for*

Wildlife group, soil series, and map symbols	Elements of wildlife habitat	
	Grain and seed crops	Grasses and legumes
Group 5a Dells (DbA). Del Rey (Dc). Hebron (HeA). Lamartine (LaB). Lawler (LeA, LlA). Matherton (Md). Muscatine (MsB2, MtA, MuA). Orion (OnA). Shiffer (SfA). Stronghurst (SsB, StA, SuA). Thackery (ThA).	Good if soil is drained, fair if undrained; wet soil.	Good if soil is drained, fair if undrained; wet soil; few species suited.
Group 5b Alluvial land, wet (Ae). Brookston (Br). Colwood (Co). Ettrick (Et). Marshan (Mb, Mc). Maumee (Me). Navan (Na). Orion (Or). Ossian (Ot). Otter (Ou). Sebewa (Se). Wallkill (Wa).	Good if soil is drained, unsuitable if undrained; very wet soil.	Fair if soil is drained; poor if undrained; very wet soil.
Group 6 Adrian (Ac). Houghton (Hu). Palms (Pa).	Fair if soil is drained, unsuitable if undrained; wet soil.	Fair if soil is drained, unsuitable if undrained; wet soil; few species suited.
Goup 7 Alluvial land (Ad). Arenzville (An). Chaseburg (ChB, ChC, Cn). Huntsville (HvA, HvB).	Good on 0 to 6 percent slopes, fair on steeper slopes; hazard of water erosion; flooding.	Good
Group 8 Riverwash (Rh). Rodman (RoC, RoE). Sogn (SoC, SoE). Steep stony and rocky land (Sp).	Poor: hazard of water erosion; shallow to rock or gravel; very low available water capacity.	Fair on 0 to 12 percent slopes and poor on steeper slopes; not all species suited; very low available water capacity.

elements of wildlife habitat—Continued

Elements of wildlife habitat—Continued				
Wild herbaceous upland plants	Hardwood trees and shrubs	Coniferous trees	Wetland food and cover plants	Shallow- and deep-water developments
Fair: seasonally wet; not all species suited.	Fair: wet soil; not all species suited.	Fair: wet soil; not all species suited.	Fair: seasonally wet; not all species suited.	Fair on 0 to 2 percent slopes and poor on steeper slopes; wet soil.
Unsuitable: very wet soil; few species suited.	Poor: very wet soil; few species suited.	Poor: very wet soil; few species suited.	Good	Good.
Unsuitable: wet soil; few species suited.	Poor: wet soil; few species suited.	Fair: wet soil; not all species suited.	Good on 0 to 2 percent slopes and fair on steeper slopes; wet soil.	Good on 0 to 2 percent slopes and fair on steeper slopes; wet soil.
Good	Fair: hazard of flooding	Fair: hazard of flooding; not all species suited.	Poor on 0 to 2 percent slopes and unsuitable on steeper slopes; few species suited.	Poor on 0 to 2 percent slopes and unsuitable on steeper slopes; moderate permeability.
Fair on 0 to 20 percent slopes and poor on steeper slopes; not all species suited; very low available water capacity.	Poor: few species suited; competition from grass; very low available water capacity.	Poor: competition from grass; few species suited; very low available water capacity.	Unsuitable: very low available water capacity; insufficient moisture.	Unsuitable: shallow to fissured dolomite or gravel.

TABLE 5.—*Suitability of wildlife habitat*

[Dashes indicate that rating of

Important wildlife species	Grain and seed crops		Grasses and legumes	
	Harvested	Unharvested	Harvested	Unharvested
Migratory waterfowl:				
Ducks	Fair	Fair	Unsuitable	Fair
Geese	Good	Good	Good	Unsuitable
Upland game birds:				
Hungarian partridge	Good	Good	Fair	Good
Pheasants	Good	Good	----	Good [5]
Quail	Good	Good	Poor	Good
Ruffed grouse	Unsuitable	Unsuitable	Unsuitable	Poor
Small game:				
Cottontail rabbits	Fair	Good	Fair	Good [5]
Raccoon	Fair	Good	----	Unsuitable
Fox and gray squirrels	Fair	Good	----	Unsuitable
Large game:				
Deer	Fair	Good	Fair	Fair
Furbearers:				
Beaver	----	----	----	----
Red fox [5]	Poor	Fair	Poor	Fair
Mink [5]	----	----	----	----
Muskrat	Unsuitable	Unsuitable	----	----

[1] Type 1 and 2 wetlands as defined by United States Department of the Interior.
[2] Type 3 and 4 wetlands as defined by United States Department of the Interior.
[3] Type 5 wetlands as defined by United States Department of the Interior.

The engineering classifications in table 9 are based on data obtained by mechanical analysis and by tests to determine liquid limits and plastic limits. The mechanical analyses were made by combined sieve and hydrometer methods. Percentages of silt and clay determined by the hydrometer method should not be used in naming textural classes for soils. The information, however, is useful in determining general engineering properties of the soils.

The tests for liquid limit and plastic limit measure the effect of water on the consistence of the soil material. As the moisture content of a clayey soil increases from a very dry state, the material changes from a semisolid to a plastic state. As the moisture content is further increased, the material changes from a plastic to a liquid state. The *plastic limit* is the moisture content at which the soil material passes from a semisolid to a plastic state. The *liquid limit* is the moisture content at which the material passes from a plastic to a liquid state. The *plasticity index* is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which a soil material is plastic.

Compaction or moisture-density values for the tested soils are given in table 9. If soil material is compacted at successively higher moisture content, assuming that the compactive effort remains constant, the density of the compacted material increases until the optimum moisture content is reached. After that, the density decreases with increase in moisture content. The highest dry density obtained in the compaction text is termed *maximum dry density* and the corresponding moisture content is *optimum moisture.* Moisture-density data are important in earthwork because, as a rule, optimum stability is obtained if the soil is compacted to about the maximum dry density when it is at approximately the optimum moisture content.

Estimated Engineering Properties

Table 6 gives the USDA textural classification of the soils in Green County and estimates of other properties significant in engineering. The estimates are based on test data in table 9 and on test data from similar soils in other counties. Where test data were not available, the estimates were based on comparison with similar soils tested and on study of the soils in the field.

The estimates are only for the soils as they occur in their natural state and not for areas that have been altered by cut and fill operations. Consequently, variations from these reported values should be expected. Descriptions of the soil profiles are given in the section "Descriptions of the Soils."

The column headed "Permeability" indicates the rate, expressed in inches per hour, at which water moves downward through the undisturbed soil. The rate of permeability is determined largely by texture, structure, and consistence and is generally determined by the least permeable layer in the soil.

The estimated available water capacity, expressed as inches of water per inch of soil, is given for the major soil horizons. Available water capacity refers to the amount of water that can be stored for plant use. The estimates are based on the difference in percentage of

elements for selected species of wildlife

the element is not applicable]

Wild herbaceous upland plants	Woody plants: Shrubs	Woody plants: Hardwood trees	Woody plants: Conifer trees	Herbaceous wetland [1] plants	Water areas: Shallow water [2]	Water areas: Deep water [3]
Fair		Unsuitable		Good [4]	Good [4]	Good.
				Poor	Fair	Good.
Good	Unsuitable			Unsuitable		
Good [4]	Good		Unsuitable	Good [4]	Fair	
Good	Good	Poor	Unsuitable	Good	Fair	
Poor	Good [4]	Good [4]	Fair			
Good [4]	Good [4]	Fair	Unsuitable	Poor	Fair	
Unsuitable	Poor	Good		Unsuitable	Good [4]	Good.
Unsuitable	Poor	Good [4]	Unsuitable			
Good	Good	Good	Good	Fair	Fair	Poor.
	Good	Good [4]		Good	Good	Good.[4]
Fair	Fair	Poor	Unsuitable	Fair	Fair	Unsuitable.
	Poor	Unsuitable	Unsuitable	Fair	Good [4]	Good.[4]
	Unsuitable			Good	Good [4]	Good.[4]

[4] Key or critical element.
[5] Carnivorous species not strictly dependent on elements listed.

moisture retained at one-third atmosphere and that retained at 15 atmospheres of moisture tension for medium- and fine-textured soils. For sandy soils the estimates are based on the difference between one-tenth atmosphere and 15 atmospheres of moisture tension.

The column headed "Reaction" indicates the estimated acidity or alkalinity of a soil and is expressed as a pH value. A pH of 7 indicates a neutral soil, a lower pH value indicates acidity, and a higher value indicates alkalinity. A knowledge of the pH of soil horizons is helpful in determining the need for lime, the hazard of corrosion for metal conduits, and the risk of deterioration for cement tile.

The shrink-swell potential refers to the change in volume of the soil material that results from a change in moisture content. It is based on volume-change tests or on observation of other physical properties of the soils. The amount and kind of clay and the content of organic matter in the soil affects the shrink-swell potential. Soils in which illite clays are predominant, for example, do not have so high a shrink-swell ratio as soils in which montmorillonite clays are predominant.

Engineering Interpretations

Estimates of the suitability of soils for various engineering uses are given in tables 7 and 8. Features or characteristics that are likely to affect various engineering practices were considered, and evaluations were based on data shown in table 9, and estimates of soil properties given in table 6, and on field performance. Following are explanations of the items shown in tables 7 and 8.

The suitability of the soils as a source for topsoil refers specifically to the use of soil material, preferably rich in organic matter, as a topdressing for roadbanks, parks, gardens, and lawns. The ratings are based mainly on the texture of the soil material and on its content of organic matter. For example, a soil that is unsuitable for use as topsoil is sandy and low in organic matter. A dark-colored soil is generally high in organic matter. Horizons described as "thin" lack sufficient material to warrant large-scale removal, but those described as thick are generally worth removing. The appraisal of subsoil material for use as topsoil meets a need in some parts of the county. Loamy subsoil material serves adequately as topsoil if it is properly treated with fertilizer and additions of organic matter.

The suitability of the soils as a source of sand and gravel refers to sources of such material that are within a depth of 5 feet. The suitability is determined for the subsoil or substratum, whichever is applicable. Some of the coarse-textured material contains appreciable amounts of fines. Many of the soils in this county are underlain by dolomite, which, when crushed, is suitable for constructing and surfacing roads. The soil maps help in locating areas where dolomite is near the surface.

The degrees of limitation shown in table 7 for highway location, foundations for low buildings, and septic tank filter fields are described as *slight*, *moderate*, *severe*, and *very severe*.

A rating of *slight* indicates no limitation or limitations

that are easily overcome. A rating of *moderate* indicates limitations that can be overcome by average management and manipulation. A rating of *severe* indicates limitations that are difficult to overcome. A rating of *very severe* indicates limitations that generally preclude use of the soil for a given purpose. Both the subsoil and substratum are considered for highway subgrade. The ratings are based mainly on soil test data. The degree to which subgrade materials are influenced by surface drainage, depth of frost penetration, and other such factors should be determined locally for each site. The surface layer generally has very severe limitations for subgrade material because of its high content of organic matter.

Table 7 also shows the limitations of the soils for foundations of buildings that are no higher than 3 stories and the features that affect the limitations. The limitations of the undisturbed soil as a base for low buildings depend mainly on the bearing capacity and shrink-swell potential of the soil. Shear strength is also a factor. Slope and erosion are local factors and are not considered in determining the ratings.

In Wisconsin the base of most foundations is placed below frost depth and below the zone of maximum shrink-swell potential. The ratings given in this survey apply to buildings, both residential and commercial, that have basements. The ratings apply only to the substratum and are greatly influenced by the depth to ground water.

Also considered in table 7 are limitations of the soils for domestic sewage disposal systems and characteristics and qualities that affect the use of these systems. Filter fields and seepage beds are the main considerations. Limitations for seepage pits, however, are also considered. For example, if the soil is coarse textured, deep, and well drained, a shallow pit may prove satisfactory; but if a soil is slowly permeable in the upper few feet and rapidly permeable in the substratum, a deep pit may be needed.

How well a sewage disposal system functions depends largely on the rate at which effluent from the tank moves into and through the soil. If permeability is moderately slow or slow, sewage effluent is likely to flow along the surface of the soil. If permeability is moderately rapid or rapid, effluent is likely to flow into the aquifer.

Other characteristics that affect limitation of a soil for a sewage disposal system are ground water level, depth to a restricting layer, kind of underlying material, probability of stream overflow, and soil slope.

Stability of soil material when wet is an important factor in determining the value of a soil for sewage disposal. If the soil is unstable, it slakes when wet. As a result, permeability and infiltration are slow, and silt filters into the tile pipes or gravel bed of the filter field.

A water table that rises to the height of the subsurface tile forces the sewage effluent upward to the surface of the soil and makes an unhealthy bog in the filter field. There should be at least 4 feet of soil material between the ground water level or hard rock formation and the bottom of the trench or filter bed for filtration and purification of septic-tank effluent. If cracked or creviced bedrock is near the surface, effluent is likely to seep into the cracks and contaminate the water supply.

Slopes of less than 12 percent can generally be used for the construction and maintenance of filter fields. On steeper slopes, however, filter fields are difficult to construct and seepage beds are impractical.

Estimates of corrosion potential in table 7 are for metal pipes and conduits laid underground. Only the underlying material, or substratum, was considered. If the surface soil and subsoil are essentially the same as the substratum in texture, drainage, acidity, content of salt, or electrical conductivity, the same rating applies. Generally, the corrosion potential for metal conduits is high in soils that have poor aeration, a high pH value, a high electrical conductivity, and a high content of salt. The corrosion potential for concrete conduits is high in soils that have a low pH value. Wetness increases the corrosion potential.

Soil features considered significant for selected farm uses of the soils are given in table 8.

Soil features for the entire soil profile are considered for reservoirs and for the embankment material, unless otherwise specified. Undisturbed soil material is considered for reservoirs and disturbed soil material, for embankments. Controlled compaction of embankments commonly results in increased density and lower permeability. The terms "subsoil" and "substratum," as used in the column headed "Embankments," refer to soil material that has been removed from these horizons. Among the features that affect the suitability of the soils for reservoirs and embankments are depth to the water table, stoniness, depth to bedrock, strength and stability, shrink-swell potential, content of organic matter, and permeability.

Among the features that affect agricultural drainage are the rate of water movement into and through the soil, the depth to a restricting layer or to bedrock, the depth to the water table, and the position of the soil on the landscape.

The need for both surface and subsurface drainage was considered. Surface drainage can be provided by ditches that are less than 30 inches deep in most mineral soils, 36 inches deep in organic soils, and 48 inches deep in sandy soils. Subsurface drainage is provided by deep ditches, title drains, or a combination of both. Such drainage removes excess water from the surface and subsoil and intercepts seepage of ground water or lowers the water table.

Consideration of soil features that affect irrigation are based mainly on depth of the soil, available water capacity, permeability, natural drainage, rate of water intake, and slope. The availability, quality, and source of water for use in irrigation are not considered. In determining the ratings in the column headed "Irrigation," it is assumed that the wet soils have been drained.

Also considered in table 8 are the soil features that affect terraces and diversions. Considerations are based mainly on the stability, texture, thickness of the soil material, the number of stones and rocks in the soil, the ease of establishing vegetation, and the topography. If terraces are properly installed and maintained, they are effective in controlling erosion and in draining the soils. Limitations for constructing, farming, and maintaining terraces on slopes of more than 12 percent are very severe. Diversions can be used effectively on steeper slopes. Diversions are also used to protect gullied areas and to divert runoff from low-lying areas, buildings, and roads.

Grassed waterways are wide, shallow, grassy channels designed to carry peak runoff following a rainstorm of

a 10-year frequency. The ratings in table 8 are based on the stability, texture, and thickness of soil material, the slope, and the ease of establishing and maintaining suitable vegetation.

Formation and Classification of Soils

This section consists of two main parts. The first part tells how the factors of soil formation have affected the development of soils in Green County. The second explains the system of soil classification currently used and places each soil in its proper category within the system.

Formation of Soils

Soil is produced by the action of soil-forming processes on materials deposited or accumulated by geologic agencies. The characteristics of the soil at any given point are determined by (1) the physical and mineral composition of the parent materials; (2) the climate under which the soil material has accumulated and existed since accumulation; (3) the plant and animal life on and in the soil; (4) the relief, or lay of the land; and (5) the length of time the forces of soil development have acted on the soil material.

Climate and vegetation are active factors of soil genesis. They act on the parent material that has accumulated through the weathering of rocks and slowly change it into a natural body with genetically related horizons. The effects of climate and vegetation are conditioned by relief. The parent material also affects the kind of profile that can be formed and, in extreme cases, determines it almost entirely. Finally, time is needed for the changing of the parent material into a soil profile. It may be much or little, but some time is always required for horizon differentiation. Usually a long time is required for the development of distinct horizons.

The factors of soil genesis are so closely interrelated in their effects on the soil that few generalizations can be made regarding the effect of any one unless conditions are specified for the other four. Many of the processes of soil development are unknown.

Parent material.—The soils of Green County formed in loess, two ages of glacial till, acid outwash, calcareous outwash, products of disintegration of dolomite and sandstone bedrock, lacustrine deposits, and alluvial deposits.

Soils of the county reflect wide ranges of characteristics associated with loess deposits and underlying strata. Soil substrata consist mainly of dolomite, sandstone, glacial till, outwash, and lacustrine sediment.

The influence of these geologic deposits and formations on soil development is determined by their physical and mineral composition. For instance, some parent rocks are consolidated, others are unconsolidated. Some are coarse textured, others are fine textured. Some are deeply mantled with loess, others have no loess mantle. Some, like the dolomite, are resistant to change; others, like the sandstone, are subject to rapid alteration under the prevailing environment. Although most parent materials of the county are mineral in composition, some are organic. These differences in parent material are important factors concerning the formation of the different kinds of soil in the area. For this reason, surface and subsurface geology of Green County is considered briefly in the following paragraphs.

The western half of Green County north of Highway No. 11 lies within the so-called "driftless," or unglaciated, part of southwestern Wisconsin. The remainder of the county has been glaciated.

The soils of the driftless area formed in loess, dolomite, and sandstone. The loess mantle, thought to be of Peorian Age, covers most of the county and is, wholly or in part, the parent material of most soils in the driftless uplands. The loess, where present, ranges in thickness from a few inches to 6 feet or more. It is usually thickest on the level or nearly level uplands, averaging from 30 to 100 inches thick. In these areas the dominant soils are those of the Ashdale, Dodgeville, Downs, Fayette, Lindstrom, NewGlarus, Palsgrove, and Tama series.

Peripheral to the centrally located, deeper loessal soils of the uplands and usually adjacent to the marginal breaks of Steep stony and rocky land are the associated Dunbarton, Edmund, Elkmound, Gale, and Northfield soils. The Dunbarton and Edmund soils formed in dolomite, and the Elkmound, Gale, and Northfield soils formed in sandstone. The lower solum in each soil formed in the residuum of the parent rock. Beyond the outer bounds of these soils, loess is thinner on the steeper slopes and in areas alongside streams where erosion is accelerated.

In places where loess is absent, unconsolidated and partly weathered rock formations are the parent material in which soils form. At one time dolomite capping may have been the continuous surface formation. As a result of geologic or normal erosion, however, the dolomite formation was probably deeply dissected and, in places, worn away. The dolomite gives way in lower levels of some stream channels to sandstone. Hixton and Northfield soils are dominantly the weathered product of sandstone with some admixture of loess.

The soils of the glaciated part of the county formed in till, outwash, and lacustrine sediment. Where the outwash and rivers have built successions of terraces in the valleys, the higher benches represent earlier deposits and the lower benches represent the later deposits. The ages of the various benches, however, are sometimes masked by later depositions of Peorian Age loess. Benches at the lower levels formed more recently and, at the lowest levels, may still be receiving deposits from periodic overflows.

The soils of the outwash plains formed in acid sand outwash or calcareous sand and gravel outwash. They have a loess mantle that ranges from 0 to more than 5 feet thick. The thickness of the loess determines the amount of development in the underlying outwash. Where it is absent, soils having a loam to sandy clay loam subsoil have formed in loamy outwash to a depth of 24 to 36 inches. Representative soils are those of the Dakota, Lawler, Meridian, and Shiffer series. In areas that have a 20- to 36-inch loess mantle, only part of the subsoil formed in the underlying sands. Representative soils are those of the Dells, Pillot, and Tell series. In areas in which the loess mantle is greater than 50 inches thick, almost the entire profile formed in loess. Representative soils are on benches in the Fayette, Muscatine, Stronghurst, and Tama series.

TABLE 6.—*Estimates of soil properties*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils in for referring to other series that appear in the first column of this table.

Soil series and map symbols	Depth to— Bedrock	Depth to— Water table	Depth from surface	Classification USDA texture
	Feet	*Feet*	*Inches*	
Adrian: Ac	>5	<1	0–26	Muck
			26–60	Sand
Alluvial land: Ad. No valid estimates can be made.				
Alluvial land, wet: Ae. No valid estimates can be made.				
Arenzville: An	>5	>5	0–23	Silt loam
			23–32	Silt loam
			32–60	Silt loam
Arland, warm variant: ArB2, ArC2, ArD2	2–4	>5	0–8	Loam
			8–30	Sandy clay loam
			30–60	Sandstone.
Ashdale: AsB2, AsC2, AsD2	3–5	>5	0–15	Silt loam
			15–41	Silty clay loam
			41–47	Clay
			47–60	Dolomite.
Billett: BlA, BlB2, BlC2	>5	>5	0–7	Sandy loam
			7–20	Loam
			20–60	Sand
Boone: BoD	2–4	>5	0–4	Fine sand
			4–36	Fine sand
			36–60	Sandstone.
Brookston: Br	>5	<1	0–18	Silt loam
			18–42	Silty clay loam
			42–60	Clay loam
Cadiz: CdB2, CdC2	>5	>5	0–9	Silt loam
			9–27	Silty clay loam
			27–38	Silty clay
			38–60	Silty clay loam
*Chaseburg: ChB, ChC, Cn. For Arenzville part of Cn, see Arenzville series.	>5	>5	0–3	Silt loam
			3–27	Silt loam
			27–60	Silt loam
Colwood: Co	>5	<1	0–19	Silt loam
			19–27	Silt loam
			27–60	Stratified silt and fine sand
Dakota: DaA, DaB2	>5	>5	0–13	Loam
			13–33	Loam
			33–60	Sand
Dells: DbA	>5	1–3	0–9	Silt loam
			9–28	Silty clay loam
			28–33	Loam
			33–60	Sand
Del Rey: Dc	>5	1–3	0–18	Silt loam
			18–26	Silty clay
			26–60	Silty clay loam
Dickinson: DdA	>5	>5	0–26	Sandy loam
			26–60	Sand

See footnotes at end of table.

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such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions
The symbol > means more than. The symbol < means less than]

Classification—Continued		Percentage passing sieve—[1]			Permeability	Available water capacity	Reaction	Shrink-swell potential
Unified	AASHO	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)				
					In./hr.	*In./in. of soil*	*pH*	
Pt					2.00–6.30	>0.20	6.6–8.4	(2)
SP	A-3	100	100	0–10	6.30–20.0	.04	6.6–7.8	Very low.
ML	A-4	100	100	85–95	0.63–2.00	.22	6.6–7.8	Low.
ML-CL or CL	A-6	100	100	85–95	0.63–2.00	.22	6.6–7.8	Low.
ML	A-4 or A-6	100	100	85–95	0.63–2.00	.22	6.6–7.8	Low.
ML-CL or CL	A-4	90–100	80–90	65–75	0.63–2.00	.16	7.4–8.4	Low.
SC	A-6	100	100	40–50	0.63–2.00	.13	5.6–6.5	Low.
ML-CL	A-6	100	100	85–95	0.63–2.00	.24	6.1–8.4	Moderate.
CL	A-6	100	100	85–95	0.63–2.00	.20	5.1–6.0	Moderate.
CH	A-7	100	100	85–95	0.20–0.63	.16	5.6–6.5	High.
SM	A-2 or A-4	100	100	30–40	2.00–6.30	.13	6.6–7.3	Low.
ML-CL	A-4	100	100	50–60	0.63–2.00	.14	5.1–6.5	Low.
SP or SP-SM	A-3	100	100	0–10	6.30–20.0	.06	5.6–6.5	Low.
SP-SM	A-3	100	100	5–10	6.30–20.0	.08	6.6–7.3	Low.
	A-3	100	100	5–10	6.30–20.0	.06	5.1–6.0	Low.
ML-CL or CL	A-4 or A-6	100	100	85–95	0.63–2.00	.24	5.6–7.3	Moderate.
CL	A-7	100	90–100	85–95	0.63–2.00	.20	7.4–7.8	Moderate.
ML-CL or CL	A-6	95–100	90–95	50–60	0.63–2.00	.10	7.4–8.4	Low.
ML	A-4	100	100	85–95	0.63–2.00	.23	5.6–7.3	Low.
CL	A-6 or A-7	100	100	85–95	0.63–2.00	.20	5.1–6.5	Moderate.
CH	A-7	100	100	85–95	0.20–0.63	.21	5.6–7.3	High.
CL	A-6 or A-7	100	100	85–95	0.20–0.63	.20	7.4–8.4	Moderate.
ML	A-4	100	100	80–90	0.63–2.00	.23	5.6–7.3	Low.
ML-CL, ML, or CL.	A-4 or A-6	100	100	80–90	0.63–2.00	.21	6.6–7.3	Low.
ML	A-4	100	100	80–90	0.63–2.00	.21	6.6–7.3	Low.
ML	A-4	100	100	75–85	0.63–2.00	.25	6.6–7.8	Low.
ML-CL or CL	A-4 or A-6	100	100	80–90	0.63–2.00	.20	6.6–7.8	Moderate.
ML	A-4	100	100	80–90	0.63–2.00	.16	7.4–8.4	Low.
ML	A-4	100	90–100	55–65	0.63–2.00	.20	4.5–7.3	Low.
CL	A-4 or A-6	100	90–100	50–60	0.63–2.00	.17	4.5–5.5	Low.
SP-SM	A-3	100	90–100	5–10	6.30–20.0	.04	5.1–6.0	Low.
ML-CL or CL	A-4 or A-6	100	100	90–100	0.63–2.00	.23	6.6–7.3	Moderate.
CL	A-6	100	100	90–100	0.63–2.00	.20	5.1–6.0	Moderate.
ML-CL or CL	A-4 or A-6	100	100	50–60	0.63–2.00	.17	5.1–6.0	Low.
SP-SM	A-3	100	90–95	5–10	6.30–20.0	.04	5.1–6.0	Low.
ML-CL or CL	A-4 or A-6	100	100	90–100	0.63–2.00	.23	5.6–6.5	Moderate.
CH	A-7	100	100	90–100	0.20–0.63	.21	5.6–7.3	High.
CL	A-6	100	100	90–100	0.20–0.63	.20	7.4–8.4	Moderate.
SM	A-2	100	100	25–35	2.00–6.30	.15	5.6–6.5	Low.
SP	A-3	95–100	90–100	0–5	6.30–20.0	.04	5.1–6.0	Low.

TABLE 6.—*Estimates of soil properties*

Soil series and map symbols	Depth to— Bedrock	Depth to— Water table	Depth from surface	Classification: USDA texture
	Feet	*Feet*	*Inches*	
Dodge: DeB2, DeC2	>5	>5	0–18	Silt loam
			18–31	Silty clay loam
			31–38	Clay loam
			38–60	Clay loam
Dodgeville: DgB2, DgC2, DgC3, DgD2	2–4	>5	0–13	Silt loam
			13–24	Silty clay loam
			24–36	Clay
			36–60	Dolomite.
Downs: DoB2, DoC2	>5	>5	0–18	Silt loam
			18–41	Silty clay loam
			41–60	Silt loam
			60–80	Dolomite.
Downs, heavy substratum: DsA, DsB, DsB2, DsC2	>5	>5	0–18	Silt loam
			18–41	Silty clay loam
			41–65	Silt loam
			65–80	Silty clay loam
Dunbarton: DuB2, DuC2, DuD2, DuE2, DvD3	1–2	>5	0–9	Silt loam
			9–15	Clay
			15–60	Dolomite.
Durand: DwB2, DwC2	>5	>5	0–12	Silt loam
			12–23	Silty clay loam
			23–64	Clay loam
			64–84	Loam
Edmund: EdB2, EdC2, EdD2	1–2	>5	0–7	Silt loam
			7–16	Clay
			16–60	Dolomite.
Eleva: EeC2, EeD2	2–4	>5	0–15	Sandy loam
			15–26	Loam
			26–32	Sandy loam
			32–39	Sand
			39–60	Sandstone.
Elkmound; ElB2, ElC2, ElD2, ElE2, ElF	1–2	>5	0–17	Sandy loam
			17–60	Sandstone.
Ettrick: Et	>5	<1	0–13	Silt loam
			13–40	Silty clay loam
			40–52	Loam
			52–60	Sand
Fayette: FaB2, FaC2, FaD2, FbA, FbB2, FbC, FcB2, FcC2, FcD2, FeC2, FeD2.	>5	>5	0–18	Silt loam
			18–41	Silty clay loam
			41–75	Silt loam
			75–100	Dolomite.
Flagg: FlA, FlB2, FlC2	>5	>5	0–20	Silt loam
			20–42	Silty clay loam
			42–64	Clay loam
			64–80	Loam
Fox: FnC2, FnD2, FoA, FoB2, FoC2, FsA, FsB2	>5	>5	0–12	Loam
			12–33	Sandy clay loam
			33–60	Sand and gravel
Gale: GaB2, GaC2, GaD2, GaE2	3–4	>5	0–15	Silt loam
			15–29	Silty clay loam
			29–34	Loam
			34–44	Sand
			44–60	Sandstone.

See footnotes at end of table.

significant in engineering—Continued

Classification—Continued		Percentage passing sieve—[1]			Permeability	Available water capacity	Reaction	Shrink-swell potential
Unified	AASHO	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)				
					In./hr.	*In./in. of soil*	*pH*	
ML–CL, ML, or CL.	A–4	100	100	90–100	0.63–2.00	0.23	6.6–7.8	Moderate.
CL	A–6 or A–7	100	90–100	85–95	0.63–2.00	.22	5.1–6.5	Moderate.
CL	A–6	100	90–100	60–70	0.63–2.00	.17	5.1–6.5	Moderate.
ML–CL, ML, or CL.	A–4	95–100	90–95	50–60	0.63–2.00	.10	7.9–8.4	Low.
ML–CL or CL	A–6	100	100	90–100	0.63–2.00	.24	6.1–7.3	Moderate.
CH	A–7	100	100	90–100	0.63–2.00	.20	5.6–6.5	Moderate.
CH	A–7	100	90–100	85–95	0.20–0.63	.16	5.6–7.4	High.
ML	A–4	100	100	90–100	0.63–2.00	.24	6.1–7.3	Moderate.
CL	A–6	100	100	90–100	0.63–2.00	.20	5.1–6.0	Moderate.
CL	A–4	100	100	90–100	0.63–2.00	.18	5.1–6.0	Low.
ML	A–4	100	100	90–100	0.63–2.00	.24	6.1–7.3	Moderate.
CL	A–6	100	100	90–100	0.63–2.00	.20	5.1–6.0	Moderate.
CL	A–4	100	100	90–100	0.63–2.00	.18	5.1–6.0	Moderate.
CL	A–4 or A–6	90–100	85–95	80–90	0.63–2.00	.10	7.4–8.4	Moderate.
ML–CL or CL	A–4 or A–6	100	100	85–95	0.63–2.00	.22	6.1–7.3	Low to moderate.
CH	A–7	100	100	90–100	0.20–0.63	.16	5.6–7.3	High.
ML	A–4	100	100	90–100	0.63–2.00	.21	5.6–7.3	Moderate.
CL	A–6	100	100	90–100	0.63–2.00	.20	5.6–6.5	Moderate.
CL	A–6	100	100	70–80	0.63–2.00	.18	5.1–6.5	Moderate.
ML–CL or CL	A–4 or A–6	90–100	80–90	50–60	0.63–2.00	.18	7.9–8.4	Low.
ML–CL or CL	A–6	100	100	90–100	0.63–2.00	.24	6.6–7.3	Moderate.
CH	A–7	100	100	90–100	0.20–0.63	.16	5.6–7.3	High.
SM	A–4	100	100	35–45	2.00–6.30	.15	5.6–6.5	Low.
ML	A–4	100	100	55–65	2.00–6.30	.20	5.1–6.5	Low.
SM	A–2 or A–4	100	100	30–40	2.00–6.30	.13	5.6–6.0	Low.
SP	A–3	100	90–100	0–5	------------	.04	4.5–5.5	Low.
SM	A–2	100	100	20–30	2.00–6.30	.13	5.1–6.5	Low.
ML–CL or CL	A–4	100	100	90–100	0.63–2.00	.24	6.6–7.3	Moderate.
CL	A–7	100	100	90–100	0.63–2.00	.20	6.6–7.8	Moderate.
CL	A–6	100	100	50–65	0.20–0.63	.17	7.7–8.4	Moderate.
SP–SM	A–3	100	100	5–10	6.30–20.0	.04	6.6–7.3	Low.
ML–CL or CL	A–4	100	100	95–100	0.63–2.00	.23	6.1–7.8	Moderate.
CL	A–7	100	100	95–100	0.63–2.00	.22	5.1–5.5	Moderate.
CL	A–7	100	100	95–100	0.63–2.00	.18	5.6–7.3	Low.
ML–CL or CL	A–4	100	100	90–100	0.63–2.00	.23	6.1–7.8	Moderate.
CL	A–7	100	100	80–90	0.63–2.00	.20	5.1–5.5	Moderate.
CL	A–6	100	85–95	75–85	0.63–2.00	.18	5.1–6.5	Moderate.
ML–CL or CL	A–4 or A–6	90–100	85–95	50–60	0.63–2.00	.17	7.4–8.4	Low.
ML–CL or CL	A–4	100	90–100	50–60	0.63–2.00	.17	6.1–7.3	Low.
SC	A–6	100	90–100	35–45	0.63–2.00	.15	5.1–7.3	Moderate.
SP or SP–SM	A–1	55–65	40–50	0–10	6.30–20.0	.05	7.4–8.4	Low.
ML–CL or CL	A–4	100	100	90–95	0.63–2.00	.23	6.1–7.8	Moderate.
CL	A–7	100	100	85–95	0.63–2.00	.20	5.1–6.5	Moderate.
ML–CL or CL	A–4 or A–6	100	80–90	50–60	0.63–2.00	.17	5.1–6.5	Moderate.
SP or SP–SM	A–3	100	100	0–10	6.30–20.0	.04	4.5–5.5	Low.

TABLE 6.—*Estimates of soil properties*

Soil series and map symbols	Depth to— Bedrock	Depth to— Water table	Depth from surface	Classification: USDA texture
	Feet	*Feet*	*Inches*	
Gotham: GoA, GoB2, GoC2	>5	>5	0–29	Loamy sand
			29–60	Sand
Griswold: GrB2, GrC2	>5	>5	0–15	Silt loam
			15–38	Sandy clay loam
			38–60	Sandy loam
Hebron: HbA, HbB2	>5	3–>5	0–13	Silt loam
			13–25	Sandy clay loam
			25–36	Silty clay
			36–60	Silty clay loam
Hebron, mottled subsoil variant: HeA	>5	3–>5	0–9	Silt loam
			9–26	Sandy clay loam
			26–33	Silty clay
			33–60	Silty clay loam
Hixton: HmB2, HmC2	2–4	>5	0–25	Loam
			25–33	Sandy loam
			33–39	Sand
			39–60	Sandstone.
Houghton: Hu	>5	<1	0–42	Mucky peat
Huntsville: HvA, HvB	>5	3–>5	0–60	Silt loam
Juda: JuB2, JuC2	>5	3–>5	0–9	Silt loam
			9–33	Silty clay loam
			33–36	Silty clay loam
			36–60	Silty clay loam
Lamartine: LaB	>5	1–3	0–11	Silt loam
			11–28	Silty clay loam
			28–38	Clay loam
			38–60	Loam
Lawler: LeA, LlA	>5	1–3	0–35	Loam
			35–60	Sand
Lindstrom: LnC2, LnD2, LsC, LsD2	>5	>5	0–44	Silt loam
			44–60	Silt loam
Marshan: Mb, Mc	>5	<1	0–18	Silt loam
			18–31	Loam
			31–60	Sand
Matherton: Md	>5	1–3	0–15	Silt loam
			15–34	Sandy clay loam
			34–60	Sand and gravel
Maumee: Me	>5	<1	0–16	Sandy loam
			16–60	Sand
Meridian: MlA, MlB2, MlC2	>5	>5	0–22	Loam
			22–60	Sand
Miami: MmB2, MmC2, MmD2	>5	>5	0–11	Silt loam
			11–28	Clay loam
			28–60	Loam

See footnotes at end of table.

significant in engineering—Continued

Classification—Continued		Percentage passing sieve—[1]			Permeability	Available water capacity	Reaction	Shrink-swell potential
Unified	AASHO	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)				
					In./hr.	*In./in. of soil*	*pH*	
SM or SP-SM	A-2	100	90–100	10–20	6. 30–20. 0	0. 11	6. 1–7. 3	Low.
SP or SP-SM	A-3	100	90–100	0–10	6. 30–20. 0	. 04	5. 1–6. 0	Low.
ML-CL, ML, or CL	A-4	100	85–95	80–85	0. 63–2. 00	. 24	6. 1–7. 3	Moderate.
SC	A-2 or A-4	100	90–100	70–80	0. 63–2. 00	. 16	6. 1–7. 3	Moderate.
SM	A-4	95–100	85–95	35–45	0. 63–2. 00	. 10	7. 4–8. 4	Low.
ML-CL, ML, or CL	A-4	100	90–100	80–90	0. 63–2. 00	. 21	6. 1–7. 8	Low.
SC	A-6	100	90–100	40–50	0. 63–2. 00	. 15	5. 1–6. 5	Moderate.
CH	A-7	100	100	90–100	0. 20–0. 63	. 21	5. 6–7. 3	High.
CL	A-6	100	100	90–100	0. 06–0. 20	. 20	7. 4–8. 4	Moderate.
ML-CL, ML, or CL	A-4	100	90–100	80–90	0. 63–2. 00	. 21	7. 4–7. 8	Low.
SC	A-6	100	90–100	40–50	0. 20–0. 63	. 15	5. 1–6. 5	Moderate.
CH	A-7	100	100	90–100	0. 20–0. 63	. 18	5. 6–7. 3	High.
CL or CH	A-6	100	100	90–100	0. 06–0. 20	. 20	7. 4–8. 4	Moderate.
ML	A-4	100	100	50–60	0. 63–2. 00	. 20	5. 1–6. 5	Low.
SM	A-4 or A-2	100	100	30–40	2. 00–6. 30	. 16	4. 5–5. 0	Low.
SP or SP-SM	A-3	100	90–100	0–10	6. 30–20. 0	. 04	4. 5–5. 0	Very low.
Pt					2. 00–6. 30	>. 20	6. 1–7. 3	(2).
CL	A-6	100	100	90–100	0. 63–2. 00	. 24	6. 1–7. 3	Moderate.
ML-CL, ML, or CL	A-4	100	100	90–100	0. 63–2. 00	. 24	5. 6–7. 3	Low.
CL	A-6 or A-7	100	100	90–100	0. 63–2. 00	. 22	5. 1–6. 5	Moderate.
CH or CL	A-7	100	90–100	80–100	0. 20–0. 63	. 21	5. 6–7. 3	High.
CL	A-6	100	90–100	80–90	0. 20–0. 63	. 16	7. 9–8. 4	Moderate.
ML-CL or CL	A-4 or A-6	100	100	80–90	0. 63–2. 00	. 23	5. 6–7. 3	Moderate.
CL	A-6 or A-7	100	100	80–90	0. 63–2. 00	. 22	5. 6–6. 5	Moderate.
CL	A-6 or A-7	90–100	90–95	65–75	0. 63–2. 00	. 18	5. 6–6. 5	Moderate.
ML-CL, ML, or CL.	A-4	80–100	70–80	50–60	0. 63–2. 00	. 17	7. 4–8. 4	Moderate.
ML	A-4	100	100	50–60	0. 63–2. 00	. 19	5. 1–6. 0	Low.
SP or SP-SM	A-3	100	100	0–10	2. 00–6. 30	. 04	5. 1–6. 0	Low.
ML-CL, ML or CL.	A-4	100	100	85–95	0. 63–2. 00	. 24	5. 6–6. 5	Moderate.
CL	A-6	100	100	80–90	0. 63–2. 00	. 21	5. 6–6. 5	Moderate.
ML	A-6	100	100	85–95	2. 00–6. 30	. 24	6. 6–8. 4	Moderate.
ML-CL, ML or CL.	A-4	100	100	50–60	0. 63–2. 00	. 17	5. 1–7. 3	Low.
SP or SP-SM	A-3	100	100	0–10	2. 00–6. 30	. 04	6. 1–8. 1	Low.
ML-CL, ML, or CL.	A-4	100	100	85–95	0. 63–2. 00	. 23	5. 6–6. 5	Low.
SC or CL	A-6	100	85–95	45–55	0. 63–2. 00	. 15	5. 1–6. 5	Moderate.
GP or GP-GM	A-1	40–50	30–40	0–10	6. 30–20. 0	. 02	7. 4–8. 4	Low.
SM	A-2 or A-4	100	100	30–40	2. 00–6. 30	. 15	6. 1–7. 3	Low.
SP or SP-SM	A-3	100	100	0–10	6. 30–20. 0	. 04	6. 1–7. 3	Low.
ML	A-4	100	100	50–60	0. 63–2. 00	. 19	5. 1–6. 5	Low.
SP or SP-SM	A-3	100	100	0–10	6. 30–20. 0	. 04	5. 1–6. 0	Low.
ML-CL or CL	A-6	100	95–100	80–90	0. 63–2. 00	. 23	6. 1–7. 3	Moderate.
CL	A-6 or A-7	95–100	90–80	60–70	0. 63–2. 00	. 18	5. 6–6. 5	Moderate.
ML-CL, ML, or CL.	A-4	90–100	85–95	50–60	0. 63–2. 00	. 17	7. 4–8. 4	Low.

TABLE 6.—*Estimates of soil properties*

Soil series and map symbols	Depth to— Bedrock	Depth to— Water table	Depth from surface	Classification USDA texture
	Feet	*Feet*	*Inches*	
Mifflin: MnC2, MnD2	3–5	>5	0–13	Loam
			13–38	Clay loam
			38–60	Dolomite.
Mifflin, shallow solum variant: MoC2, MoD2		>5	0–11	Loam
			11–18	Sandy clay
			18–40	Dolomite.
Morley: MrB2, MrC2, MrD2	>5	>5	0–17	Silt loam
			17–34	Silty clay
			34–60	Silty clay loam
Muscatine: MsB2, MtA, MuA	>5	1–3	0–15	Silt loam
			15–36	Silty clay loam
			36–60	Silt loam
Myrtle: MyB2, MyC2	>5	>5	0–13	Silt loam
			13–42	Silty clay loam
			42–70	Clay loam
			70–80	Loam
Navan: Na	>5	<1	0–15	Silt loam
			15–30	Sandy clay loam
			30–36	Silty clay
			36–60	Silty clay loam
New Glarus: NgB2, NgC2, NgD2, NgE2, NIC3, NID3	2–4	>5	0–13	Silt loam
			13–23	Silty clay loam
			23–35	Clay
			35–60	Dolomite.
Northfield: NoB2, NoC2, NoD2, NoE2	1–2	>5	0–11	Loam
			11–16	Sandy loam
			16–60	Sandstone.
Ockley: OcA, OeA, OeB, OkA, OkB2, OkC2	>5	>5	0–11	Loam
			11–33	Sandy clay loam
			33–54	Sandy loam
			54–60	Sand and gravel
Ogle: OlB2, OlC2	>5	>5	0–25	Silt loam
			25–41	Silty clay loam
			41–65	Clay loam
			65–80	Loam
Orion: OnA	>5	1–3	0–60	Silt loam
Orion, wet variant: Or	>5	<1	0–28	Silt loam
			28–60	Silty clay loam
Oshtemo: OsA, OsB2, OsC2	>5	>5	0–10	Loamy sand
			10–48	Sandy loam
			48–60	Sand and gravel

See footnotes at end of table.

significant in engineering—Continued

Classification—Continued		Percentage passing sieve—[1]			Permeability	Available water capacity	Reaction	Shrink-swell potential
Unified	AASHO	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)				
					In./hr.	*In./in. of soil*	*pH*	
ML–CL, ML, or CL.	A–4	95–100	85–95	50–60	0. 63–2. 00	0. 18	5. 1–6. 5	Low.
CL	A–6	100	100	60–70	0. 63–2. 00	. 18	5. 1–6. 5	Moderate.
ML–CL, ML, or CL.	A–4	95–100	85–95	50–60	0. 63–2. 00	. 18	5. 6–6. 5	Low.
SC	A–7	100	90–100	40–50	0. 06–0. 20	. 14	5. 6–6. 5	High.
ML–CL or CL	A–4 or A–6	100	100	90–100	0. 63–2. 00	. 22	6. 1–7. 3	Moderate.
CH	A–7	100	100	80–90	0. 20–0. 63	. 21	6. 1–8. 4	High.
CL	A–6 or A–7	100	100	80–90	0. 20–0. 63	. 20	7. 4–8. 4	Moderate.
ML	A–4	100	100	90–100	0. 63–2. 00	. 24	6. 1–7. 3	Moderate.
ML–CL or CL	A–6	100	100	90–100	0. 63–2. 00	. 22	5. 1–6. 5	Moderate.
CL	A–6	100	100	90–100	0. 63–2. 00	. 18	6. 1–7. 3	Moderate.
ML–CL or CL	A–6	100	100	85–95	0. 63–2. 00	. 22	6. 1–7. 3	Moderate.
ML–CL or CL	A–6	100	100	90–100	0. 63–2. 00	. 22	5. 1–6. 0	Moderate.
CL	A–6	100	90–100	70–80	0. 63–2. 00	. 18	5. 6–6. 5	Moderate.
ML–CL, ML, or CL.	A–4	95–100	85–95	50–60	0. 63–2. 00	. 17	7. 4–8. 4	Low.
ML–CL, ML, or CL.	A–4	100	95–100	80–90	0. 63–2. 00	. 25	6. 6–7. 8	Low.
SC or CL	A–6	95–100	90–95	45–55	0. 63–2. 00	. 15	5. 1–6. 0	Moderate.
CH	A–7	100	100	85–95	0. 20–0. 63	. 18	5. 6–7. 3	High.
CL	A–6	100	100	85–95	0. 06–0. 20	. 20	7. 4–8. 4	High.
ML–CL, ML, or CL.	A–4	100	100	85–95	0. 63–2. 00	. 22	5. 6–6. 5	Low.
CH or CL	A–6 or A–7	100	100	85–95	0. 63–2. 00	. 20	6. 1–6. 5	Moderate.
CH	A–7	100	100	90–100	0. 20–0. 63	. 16	5. 6–7. 3	High.
ML	A–4	100	90–100	60–70	0. 63–2. 00	. 17	5. 1–6. 5	Low.
SM	A–2 or A–4	100	90–100	30–40	2. 00–6. 30	. 17	4. 5–6. 0	Low.
ML	A–4	100	90–100	50–60	0. 63–2. 00	. 18	6. 1–7. 3	Low.
SC or CL	A–6	95–100	80–90	35–55	0. 63–2. 00	. 16	5. 6–6. 5	Moderate.
SM, SC, or SM–SC.	A–2 or A–4	95–100	80–90	30–40	2. 00–6. 30	. 13	5. 1–6. 5	Low.
SW or SW–SM	A–1	90–100	40–50	0–10	6. 30–20. 0	. 02	7. 4–8. 4	Low.
ML	A–4	100	100	90–100	0. 63–2. 00	. 25	6. 1–7. 3	Moderate.
CL	A–6 or A–7	100	100	90–100	0. 63–2. 00	. 22	5. 1–6. 5	Moderate.
CL	A–6 or A–7	100	95–100	70–80	0. 63–2. 00	. 18	5. 1–6. 5	Moderate.
ML–CL, ML, or CL.	A–4	90–100	85–90	50–60	0. 63–2. 00	. 18	7. 4–8. 4	Low.
ML	A–4	100	100	90–100	0. 63–2. 00	. 23	6. 6–7. 8	Moderate.
ML	A–4	100	100	90–100	0. 63–2. 00	. 24	6. 1–7. 3	Moderate.
CL	A–6 or A–7	100	100	90–100	0. 20–0. 63	. 22	6. 1–7. 3	Moderate.
SM	A–2	100	80–90	20–30	2. 00–6. 30	. 15	6. 6–7. 3	Low.
SM	A–2 or A–4	100	80–90	30–40	2. 00–6. 30	. 11	4. 5–6. 5	Low.
SW or SW–SM	A–3	80–90	40–50	0–10	6. 30–20. 0	. 04	7. 4–8. 4	Low.

TABLE 6.—*Estimates of soil properties*

Soil series and map symbols	Depth to— Bedrock	Depth to— Water table	Depth from surface	Classification USDA texture
	Feet	*Feet*	*Inches*	
Ossian: Ot	>5	<1	0–19	Silt loam
			19–30	Silty clay loam
			30–80	Silt loam
			80–100	Sand
Otter: Ou	>5	<1	0–60	Silt loam
Palms: Pa	>5	<1	0–26	Muck
			26–60	Silt loam
Palsgrove: PgB2, PgC2, PgD2, PlD3	3–5	>5	0–16	Silt loam
			16–41	Silty clay loam
			41–49	Clay
			49–60	Dolomite.
Pecatonica: PnB2, PnC2, PnD2	>5	>5	0–16	Silt loam
			16–37	Silty clay loam
			37–80	Clay loam
			80–100	Loam
Pillot: PoA, PoB2, PoC2	>5	>5	0–22	Silt loam
			22–29	Silty clay loam
			29–33	Loam
			33–60	Sand
Plainfield: PrB2	>5	>5	0–9	Loamy sand
			9–50	Sand
Riverwash: Rh. No reliable estimates can be made.				
Rockton: RkC2, RkD2, RnB2, RnC2	2–4	>5	0–19	Silt loam
			19–30	Clay loam
			30–33	Clay
			33–60	Dolomite.
Rodman: RoC, RoE	>5	>5	0–9	Gravelly loam
			9–60	Gravel
Saybrook: SaB2, SaC2	>5	>5	0–13	Silt loam
			13–30	Silty clay loam
			30–39	Clay loam
			39–60	Loam
Saylesville: ScB2	>5	+3–5	0–15	Silt loam
			15–24	Silty clay loam
			24–34	Silty clay
			34–60	Silty clay loam
Sebewa: Se	>5	<1	0–13	Silt loam
			13–34	Clay loam
			34–60	Sand and gravel
Shiffer: SfA	>5	1–3	0–30	Loam
			30–60	Sand
Sogn: SoC, SoE	<1	>5	0–9	Silt loam
			9–20	Dolomite.
Steep stony and rocky land: Sp. No reliable estimates can be made.				

See footnotes at end of table.

significant in engineering—Continued

Classification—Continued		Percentage passing sieve—[1]			Permeability	Available water capacity	Reaction	Shrink-swell potential
Unified	AASHO	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)				
					In./hr.	*In./in. of soil*	*pH*	
ML–CL, ML, or CL.	A–4	100	100	90–100	0. 63–2. 00	0. 24	6. 1–7. 3	Moderate.
CL or CH	A–7	100	100	90–100	0. 63–2. 00	. 20	6. 1–6. 5	Moderate.
CL	A–6	100	100	90–100	0. 63–2. 00	. 21	6. 1–7. 3	Moderate.
SP or SP–SM	A–3	100	100	0–10	6. 30–20. 0	. 04	6. 6–8. 4	Low.
ML	A–4 or A–6	100	100	100	0. 63–2. 00	. 24	6. 1–7. 3	Moderate.
Pt					2. 00–6. 30	. 27	6. 1–7. 8	[2]
ML–CL or CL	A–6	90–100	90–100	70–80	0. 63–2. 00	. 14	6. 6–7. 8	Moderate.
ML–CL or CL	A–6	100	100	90–100	0. 63–2. 00	. 24	5. 1–6. 5	Moderate.
CL	A–6	100	100	90–100	0. 63–2. 00	. 22	5. 1–6. 5	Moderate.
CH	A–7	100	95–100	85–95	0. 20–0. 63	. 16	6. 6–7. 3	High.
ML or CL	A–4	100	100	85–95	0. 63–2. 00	. 23	5. 6–6. 5	Moderate.
CL	A–6	100	95	85–95	0. 63–2. 00	. 22	5. 1–6. 0	Moderate.
CL	A–6	100	100	60–70	0. 63–2. 00	. 18	5. 1–6. 5	Moderate.
ML–CL, ML, or CL.	A–4	85–95	75–85	50–60	0. 63–2. 00	. 17	7. 4–8. 4	Low.
ML or CL	A–6	100	100	90–100	0. 63–2. 00	. 24	6. 1–7. 3	Moderate.
CL	A–6	100	100	85–95	0. 63–2. 00	. 22	5. 6–6. 5	Moderate.
ML–CL or CL	A–4	100	100	65–75	0. 63–2. 00	. 17	5. 1–6. 0	Low.
SP or SP–SM	A–3	90–100	80–90	0–10	6. 30–20. 0	. 04	5. 1–6. 0	Low.
SM	A–2	100	100	15–30	2. 00–6. 30	. 07	6. 6–7. 3	Low.
SP or SP–SM	A–3	100	90–100	0–10	6. 30–20. 0	. 04	5. 1–6. 5	Low.
ML–CL or CL	A–6	100	100	90–100	0. 63–2. 00	. 24	6. 1–7. 3	Moderate.
CL	A–6	100	100	70–80	0. 63–2. 00	. 18	5. 6–6. 5	Moderate.
CH	A–7	100	95–100	90–95	0. 06–0. 20	. 20	5. 6–6. 5	High.
SM	A–4	85–95	70–80	40–50	2. 00–6. 30	. 10	7. 4–8. 4	Low.
GW or GW–GM	A–1	35–45	25–35	0–10	6. 30–20. 0	. 02	7. 4–8. 4	Low.
ML–CL or CL	A–4	100	100	90–100	0. 63–2. 00	. 25	5. 6–6. 5	Moderate.
CL	A–6	100	100	90–100	0. 63–2. 00	. 22	5. 6–6. 5	Moderate.
CL	A–6	100	90–100	70–80	0. 63–2. 00	. 18	5. 6–6. 5	Moderate.
ML–CL or CL	A–4	85–90	75–85	50–60	0. 63–2. 00	. 17	7. 4–8. 4	Low.
ML–CL or CL	A–4	100	100	90–100	0. 63–2. 00	. 23	6. 1–7. 3	Moderate.
CL	A–6	100	100	90–100	0. 63–2. 00	. 20	6. 1–6. 5	Moderate.
CH	A–7	100	100	90–100	0. 20–0. 63	. 21	5. 6–7. 3	High.
CL	A–6	100	100	90–100	0. 20–0. 63	. 20	7. 4–8. 4	Moderate.
ML–CL or CL	A–6	100	100	90–100	0. 63–2. 00	. 24	7. 4–8. 4	Moderate.
CL	A–6	100	90–95	70–80	0. 63–2. 00	. 20	7. 4–8. 4	Moderate.
SW or SW–SM	A–1	80–90	40–50	0–10	6. 30–20. 0	. 02	7. 4–8. 4	Low.
ML–CL or CL	A–4	100	100	65–75	0. 63–2. 00	. 18	4. 6–7. 3	Low.
SP or SP–SM	A–3	100	90–100	0–10	2. 00–6. 30	. 04	4. 5–5. 0	Low.
ML–CL or CL	A–6 or A–7	100	100	85–95	0. 63–2. 00	. 24	7. 4–8. 4	Moderate.

TABLE 6.—*Estimates of soil properties*

Soil series and map symbols	Depth to— Bedrock	Water table	Depth from surface	Classification USDA texture
	Feet	*Feet*	*Inches*	
Stronghurst: SsB, StA, SuA	>5	1–3	0–14	Silt loam
			14–35	Silty clay loam
			35–60	Silt loam
			60–80	Dolomite.
Sylvester: SyB2, SyC2	2–4	>5	0–14	Silt loam
			14–25	Silty clay loam
			25–32	Loam
			32–60	Weakly cemented sandstone
Tama: TaB2, TaC2, TbA, TbB	>5	>5	0–28	Silt loam
			28–43	Silty clay loam
			43–60	Silt loam
			60–80	Dolomite.
Tell: TcA, TcB2, TcC2	2–4	>5	0–18	Silt loam
			18–30	Silty clay loam
			30–34	Loam
			34–60	Sand
Terrace escarpments: Te. No valid estimates can be made.				
Thackery: ThA	>5	1–3	0–16	Silt loam
			16–30	Sandy clay loam
			30–48	Loam
			48–60	Sand and gravel
Wallkill: Wa	>5	<1	0–24	Silt loam
			24–60	Mucky peat
Westville: WdC2, WeB2, WeC2, WeD2	>5	>5	0–14	Silt loam
			14–68	Clay loam
			68–80	Sandy loam
Whalan: WhB2, WhC2, WlB2, WlC2, WlD2	2–4	>5	0–10	Silt loam
			10–28	Clay loam
			28–33	Clay
			33–60	Dolomite.
Winnebago: WnB2, WnC2	>5	>5	0–13	Silt loam
			13–63	Clay loam
			63–70	Sandy loam

[1] The range in values for the percentage passing the various sieves is plus or minus 5 percent of the values given.

significant in engineering—Continued

Classification—Continued		Percentage passing sieve—[1]			Permeability	Available water capacity	Reaction	Shrink-swell potential
Unified	AASHO	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)				
					In./hr.	*In./in. of soil*	*pH*	
ML-CL, ML, or CL.	A-4	100	100	90-100	0. 63-2. 00	0. 24	6. 1-7. 3	Moderate.
CL	A-7	100	100	90-100	0. 63-2. 00	. 22	5. 1-6. 0	Moderate.
CL	A-6	100	100	90-100	0. 63-2. 00	. 18	6. 1-7. 3	Moderate.
ML-CL, ML, or CL.	A-4	100	100	90-100	0. 63-2. 00	. 24	5. 1-7. 3	Moderate.
CL	A-6	100	100	90-100	0. 63-2. 00	. 22	5. 1-6. 0	Moderate.
ML-CL, ML, or CL.	A-4	100	100	60-70	0. 63-2. 00	. 18	5. 1-6. 0	Low.
SP or SP-SM	A-3	100	90-100	0-10	2. 00-6. 30	. 04	4. 5-5. 5	Low.
ML-CL, ML, or CL.	A-6 or A-7	100	100	90-100	0. 63-2. 00	. 25	5. 6-7. 8	Moderate.
CL	A-7	100	100	90-100	0. 63-2. 00	. 22	5. 1-6. 5	Moderate.
CL	A-6 or A-7	100	100	90-100	0. 63-2. 00	. 18	5. 6-6. 5	Moderate.
ML-CL, ML, or CL.	A-4	100	100	90-100	0. 63-2. 00	. 23	5. 1-7. 3	Moderate.
CL	A-6	100	100	90-100	0. 63-2. 00	. 20	5. 1-6. 0	Moderate.
ML-CL, ML, or CL.	A-4	100	100	60-70	0. 63-2. 00	. 17	5. 1-6. 0	Low.
SP or SP-SM	A-3	100	90-100	0-10	6. 30-20. 0	. 04	5. 1-6. 0	Low.
ML	A-4	100	----------	90-100	0. 63-2. 00	. 24	4. 5-5. 5	Moderate.
SC or CL	A-6	100	80-90	45-55	0. 63-2. 00	. 13	4. 5-5. 0	Moderate.
ML-CL, ML, or CL.	A-4	100	100	60-70	0. 63-2. 00	. 17	4. 5-7. 3	Moderate.
SW or SW-SM	A-1	90-100	50-90	0-10	6. 30-20. 0	. 02	7. 4-8. 4	Low.
ML-CL or ML	A-4	100	100	90-100	0. 63-2. 00	. 20	6. 1-7. 3	Moderate.
Pt	----------	----------	----------	----------	2. 00-6. 30	>. 20	6. 6-7. 8	Moderate.
ML-CL or CL	A-6	100	100	90-100	0. 63-2. 00	. 24	5. 1-7. 3	Moderate.
CL or SC	A-6	95-100	85-95	45-70	0. 63-2. 00	. 18	5. 6-6. 0	Moderate.
SM	A-2 or A-4	95-100	85-95	30-40	6. 30-20. 0	. 02	7. 4-8. 4	Low.
ML	A-4	100	100	90-100	0. 63-2. 00	. 23	6. 1-7. 3	Moderate.
CL	A-6	95-100	85-95	55-70	0. 63-2. 00	. 17	5. 1-6. 0	Moderate.
CH	A-7	100	100	90-100	0. 06-0. 20	. 16	5. 6-6. 5	High.
ML	A-4	100	85-95	50-60	0. 63-2. 00	. 25	6. 1-7. 3	Moderate.
CL	A-6	90-95	80-90	60-70	0. 63-2. 00	. 15	5. 6-7. 8	Moderate.
SM	A-2 or A-4	95-100	85-95	30-40	0. 63-2. 00	. 10	7. 4-8. 4	Low.

[2] Not rated.

TABLE 7.—*Engineering interpretations for*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils for referring to other series that

Soil series and map symbols	Suitability as source of—	
	Topsoil	Sand and gravel
Adrian: Ac	Poor: erodible; oxidizes rapidly	Fair: fines in underlying sand in places; high water table.
Alluvial land:		
Ad	Poor: droughty; subject to flooding	Fair: poorly graded sand; layers of fines
Ae	Poor: sandy; subject to blowing; high water table.	Fair: poorly graded sand; layers of fines
Arenzville: An	Surface layer good; subsoil fair, thick; subject to overflow.	Unsuitable: very low sand and gravel content.
Arland: ArB2, ArC2, ArD2	Surface layer good; subsoil poor, sandy in lower part.	Fair: suitable for sand where bedrock is weakly cemented.
Ashdale: AsB2, AsC2, AsD2	Surface layer good; subsoil fair, clayey	Unsuitable: clayey
Billett: BlA, BlB2, BlC2	Fair: sandy	Good
Boone: BoD	Unsuitable: droughty; blows easily	Good: poorly graded sand
Brookston: Br	Surface layer good; subsoil poor to unsuitable; high water table.	Unsuitable: high water table; low sand and gravel content.
Cadiz: CdB2, CdC2	Surface layer good; subsoil unsuitable, clayey.	Unsuitable: very low sand and gravel content.
*Chaseburg: ChB, ChC, Cn. For Arenzville part of Cn, see Arenzville series.	Surface layer good; subsoil fair; subject to overflow.	Unsuitable: low sand and gravel content
Colwood: Co	Surface layer good; subsoil poor, unstable on slope; high water table.	Poor: substratum contains pockets of poorly graded fine sand.
Dakota: DaA, DaB2	Surface layer good; subsoil fair, thin over sand.	Good
Dells: DbA	Surface layer good; subsoil poor, sandy in lower part.	Fair: substratum is poorly graded sand
Del Rey: Dc	Surface layer good; subsoil fair, unstable on slopes.	Unsuitable: very low sand and gravel content.
Dickinson: DdA	Surface layer fair, thick; subsoil poor, thin over sand; low available water capacity.	Good: poorly graded sand
Dodge: DeB2, DeC2	Surface layer good; subsoil fair, clayey	Poor: pockets of well-graded sand and gravel.

See footnotes at end of table.

civil engineering and public roads

in such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions appear in the first column of this table]

Degree and kind of limitation for—			Corrosion potential for uncoated steel [2]
Highway location [1]	Foundations for low buildings [1]	Septic tank filter fields	
Very severe: very poor stability; moderate bearing capacity; high water table.	Very severe: moderate bearing capacity; high water table.	Very severe: high water table.	High in organic soil; moderate in sand.
Severe: layers of silt; subject to flooding.	Moderate: low compressibility; good shear strength; liquefies easily; subject to flooding.	Severe: frequent flooding	Low.
Very severe: layers of silt; high water table; frequent flooding.	Very severe: frequent flooding	Very severe: high water table; frequent flooding.	Low.
Severe: very poor stability; very low bearing capacity; subject to flooding.	Severe: liquefies easily; subject to frost heave; fair shear strength; moderate compressibility; subject to flooding.	Severe: subject to flooding; lacks water stable aggregates.	Moderate.
Moderate: weakly cemented bedrock at a depth of 2 to 4 feet.	Slight: good shear strength; very low compressibility; high bearing capacity.	Moderate if slope is 2 to 12 percent, severe if 12 to 20 percent; bedrock at a depth of 2 to 4 feet.	Low.
Moderate: high shrink-swell potential; elastic.	Moderate: high shrink-swell potential in clay residuum.	Moderate if slope is 0 to 12 percent, severe if 12 to 20 percent; bedrock at a depth of 3 to 5 feet.	Low.
Slight	Slight	Slight if slope is 0 to 6 percent, moderate if 6 to 12 percent.	Low.
Moderate: loose sand; bedrock at a depth of 2 to 4 feet.	Slight	Moderate if slope is 0 to 12 percent, severe if 12 to 20 percent; danger of ground water contamination.	Low.
Severe: moderate shrink-swell potential; low bearing capacity; elastic; high water table.	Severe: fair shear strength; low compressibility; high water table.	Very severe: high water table	High.
Moderate: moderate shrink-swell potential; low bearing capacity.	Moderate: moderate shrink-swell potential, compressibility, and bearing capacity.	Severe: slowly permeable	High.
Moderate: occasional flooding; severe frost hazard.	Severe: subject to frost heave; moderate bearing capacity; occasional flooding.	Severe: subject to overflow	Low.
Severe: low bearing capacity; high water table; unstable.	Severe: liquefies easily; very subject to frost heave; low bearing capacity on thawing; low compressibility; water table on surface to a depth of 1 foot.	Very severe: high water table.	High.
Slight	Slight	Moderate: danger of ground water contamination.	Low.
Moderate: moderate shrink-swell potential; low bearing capacity.	Moderate: good shear strength; very low compressibility; seasonal high water table.	Severe: seasonal high water table	Low.
Moderate: high plasticity; seasonal high water table.	Moderate: fair shear strength; moderate compressibility; seasonal high water table.	Severe: high water table; moderate permeability.	High.
Slight	Slight	Moderate: danger of ground water contamination.	Low.
Slight	Slight	Slight if slope is 0 to 6 percent, moderate if 6 to 12 percent; moderately permeable.	Moderate.

TABLE 7.—*Engineering interpretations for*

Soil series and map symbols	Suitability as source of—	
	Topsoil	Sand and gravel
Dodgeville: DgB2, DgC2, DgC3, DgD2	Surface layer good; subsoil fair, clayey	Unsuitable: very low sand and gravel content.
Downs:		
DoB2, DoC2	Surface layer good; subsoil fair, clayey	Unsuitable: very low sand and gravel content.
DsA, DsB, DsB2, DsC2	Surface layer good; subsoil fair, clayey	Unsuitable: very low sand and gravel content.
Dunbarton: DuB2, DuC2, DuD2, DuE2, DvD3.	Surface layer poor, thin; subsoil unsuitable, clayey.	Unsuitable: very low sand and gravel content.
Durand: DwB2, DwC2	Surface layer good; subsoil fair	Poor: pockets of sand and gravel
Edmund: EdB2, EdC2, EdD2	Surface layer good; subsoil poor, clayey	Unsuitable: very low sand and gravel content.
Eleva: EeC2, EeD2	Surface layer fair; subsoil fair, lower part droughty.	Good
Elkmound: ElB2, ElC2, ElD2, ElE2, ElF.	Surface layer good; subsoil poor, thin over sandstone bedrock.	Fair: weakly cemented sandstone
Ettrick: Et	Surface layer good; subsoil poor; high water table; frequent flooding.	Unsuitable: very low sand and gravel content.
Fayette:		
FaB2, FaC2, FaD2	Surface layer good; subsoil poor, clayey	Unsuitable: very low sand and gravel content.
FbA, FbB2, FbC	Surface layer good; subsoil poor, clayey, thick.	Unsuitable: low sand and gravel content
FcB2, FcC2, FcD2	Surface layer good; subsoil poor, clayey, thick.	Unsuitable: very low sand and gravel content.
FeC2, FeD2	Surface layer good; subsoil fair, slightly clayey, thick.	Unsuitable: very low sand and gravel content.
Flagg: FlA, FlB2, FlC2	Surface layer good; subsoil fair, clayey	Poor: few pockets of sand and gravel
Fox:		
FoA, FoB2, FoC2	Surface layer good; subsoil fair, clayey in lower part.	Good
FnC2, FnD2	Surface layer fair; subsoil fair, clayey	Good
FsA, FsB2	Surface layer good; subsoil fair, clayey	Good
Gale: GaB2, GaC2, GaD2, GaE2	Surface layer good; subsoil fair, lower part sandy in places.	Good

See footnotes at end of table.

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Degree and kind of limitation for—			Corrosion potential for uncoated steel [2]
Highway location [1]	Foundations for low buildings [1]	Septic tank filter fields	
Moderate: high plasticity; 2 to 4 feet to bedrock.	Slight if footings rest on dolomite bedrock.	Severe: bedrock at a depth of 2 to 4 feet.	Low to moderate.
Moderate: moderate bearing capacity; danger of frost heave.	Moderate: moderate compressibility and bearing capacity; fair shear strength.	Slight if slope is 0 to 6 percent, moderate if 6 to 12 percent; moderately permeable.	Low.
Severe: low bearing capacity; danger of frost heave.	Moderate: high compressibility; moderate bearing capacity; fair shear strength.	Slight if slope is 0 to 6 percent, moderate if 6 to 12 percent; moderately permeable.	Low.
Severe: dolomite bedrock at a depth of 1 to 2 feet.	Severe: dolomite bedrock at a depth of 1 to 2 feet.	Very severe: dolomite bedrock at a depth of 1 to 2 feet; danger of ground water contamination.	Low.
Slight	Slight	Slight: moderately permeable	Moderate.
Severe: bedrock at a depth of 1 to 2 feet.	Severe: bedrock at a depth of 1 to 2 feet.	Very severe: dolomite at a depth of 1 to 2 feet; danger of ground water contamination.	Low.
Moderate: 2 to 4 feet to sandstone bedrock.	Slight	Moderate if slope is 6 to 12 percent, severe if 12 to 20 percent; danger of ground water contamination.	Low.
Moderate: sandstone bedrock at a depth of 1 to 2 feet.	Slight: weakly cemented sandstone at a depth of 1 to 2 feet.	Moderate: shallow to weakly cemented sandstone; danger of ground water contamination.	Low.
Severe: high water table; frequent flooding.	Severe: high compressibility; fair shear strength; high water table.	Very severe: high water table; frequent flooding.	Moderate.
Moderate: moderate frost heave	Moderate: subject to frost heave; moderate bearing capacity and compressibility; fair shear strength.	Slight if slope is 2 to 6 percent, moderate if 6 to 12 percent, and severe if 12 to 20 percent; moderately permeable.	Low.
Moderate: moderate frost heave in upper part, slight in underlying sand.	Moderate: subject to frost heave; moderate bearing capacity and compressibility; fair shear strength.	Slight if slope is 0 to 6 percent, moderate if 6 to 12 percent, moderately permeable.	Low.
Moderate: moderate frost heave in upper part, slight in underlying sand.	Moderate: subject to frost heave; moderate bearing capacity and compressibility; fair shear strength.	Moderate if slope is 6 to 12 percent, severe if 12 to 20 percent; moderately permeable.	Low.
Moderate: moderate frost heave	Moderate: subject to frost heave; moderate bearing capacity and compressibility; fair shear strength.	Moderate if slope is 6 to 12 percent, severe if 12 to 20 percent; moderately permeable.	Low.
Moderate: moderate frost heave	Slight	Slight if slope is 0 to 6 percent, moderate if 6 to 12 percent; moderately permeable.	Moderate.
Slight	Slight: good shear strength	Moderate: danger of ground water contamination.	Moderate.
Slight	Slight: good shear strength	Moderate if slope is 6 to 12 percent, severe if 12 to 20 percent; danger of ground water contamination.	Low.
Slight	Slight: good shear strength	Moderate: danger of ground water contamination.	Low.
Moderate: sandstone bedrock at a depth of 2 to 4 feet; danger of frost heave.	Slight	Moderate if slope is 2 to 12 percent, severe if 12 to 20 percent; danger of ground water contamination.	Low.

TABLE 7.—*Engineering interpretations for*

Soil series and map symbols	Suitability as source of— Topsoil	Suitability as source of— Sand and gravel
Gotham: GoA, GoB2, GoC2	Poor: sandy, droughty; blows easily	Good
Griswold: GrB2, GrC2	Surface layer good; subsoil fair, sandy, droughty.	Poor: low sand and gravel content
Hebron:		
HbA, HbB2	Surface layer good; subsoil fair, clayey	Unsuitable: very low sand and gravel content.
HeA	Surface layer good; subsoil fair, clayey	Unsuitable: very low sand and gravel content.
Hixton: HmB2, HmC2	Surface layer good; subsoil fair, lower part droughty.	Good
Houghton: Hu	Poor: erodible; oxidizes rapidly.	Unsuitable: no sand or gravel.
Huntsville: HvA, HvB	Good	Unsuitable: very low sand and gravel content.
Juda: JuB2, JuC2	Surface layer good; subsoil unsuitable, clayey.	Unsuitable: very low sand and gravel content.
Lamartine: LaB	Surface layer good; subsoil fair, thick	Poor: pockets of sand and gravel
Lawler: LeA, LIA	Surface layer good; subsoil fair, thin over sand.	Good
Lindstrom:		
LnC2, LnD2	Surface layer and subsoil fair; blows easily	Unsuitable: very low sand and gravel content.
LsC, LsD2	Surface layer good; subsoil fair, thick	Unsuitable: very low sand and gravel content.
Marshan: Mb, Mc	Surface layer good; subsoil fair, erodible on slope, high water table.	Fair: poorly graded sand; high water table.
Matherton: Md	Surface layer good; subsoil fair, clayey	Good
Maumee: Me	Poor: sandy; droughty; high water table	Fair: poorly graded sand; high water table.
Meridian: MIA, MIB2, MIC2	Surface layer good; subsoil fair, thin over sand.	Good
Miami: MmB2, MmC2 MmD2	Surface layer good; subsoil fair, clayey	Poor: pockets of well-graded sand and gravel.
Mifflin:		
MnC2, MnD2	Surface layer good; subsoil fair, thin over bedrock, clayey.	Unsuitable: very low sand and gravel content.
MoC2, MoD2	Surface layer poor, thin; subsoil unsuitable, clayey.	Unsuitable: very low sand and gravel content.

See footnotes at end of table.

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Degree and kind of limitation for—			Corrosion potential for uncoated steel [2]
Highway location [1]	Foundations for low buildings [1]	Septic tank filter fields	
Slight	Slight	Moderate: danger of ground water contamination.	Low.
Slight	Slight	Slight if slope is 0 to 6 percent, moderate if 6 to 12 percent; moderately permeable.	Low.
Moderate: poor stability; low bearing capacity.	Moderate: moderate shrink-swell potential; fair shear strength.	Moderate: moderately slow permeability.	Moderate.
Moderate: poor stability; low bearing capacity. Severe in substratum; unstable.	Severe: fair shear strength; moderate bearing capacity; high water table.	Very severe: high water table; slowly permeable substratum.	High.
Moderate: 2 to 4 feet to sandstone bedrock.	Slight	Moderate: danger of ground water contamination.	Low.
Very severe: very poor stability; very low bearing capacity; high water table.	Very severe: very low bearing capacity; unstable; high water table.	Very severe: high water table	High.
Severe: poor stability; moderate bearing capacity; subject to flooding.	Severe: moderate bearing capacity; fair shear strength; subject to flooding.	Very severe: stream overflow: lacks water stable aggregates.	Moderate.
Moderate: moderate shrink-swell potential; low bearing capacity.	Moderate: moderate shrink-swell potential, compressibility, and bearing capacity.	Severe: slowly permeable	High.
Moderate: seasonal high water table; danger of frost heave.	Moderate: moderate bearing capacity; seasonal high water table.	Severe: seasonal high water table	High.
Moderate: seasonal high water table	Moderate: moderate bearing capacity; seasonal high water table.	Very severe: seasonal high water table.	Low.
Moderate: danger of frost heave	Moderate: moderate bearing capacity and compressibility; fair shear strength.	Moderate if slope is 6 to 12 percent, severe if 12 to 20 percent; moderately permeable.	Low.
Moderate: danger of frost heave	Moderate: moderate bearing capacity and compressibility; fair shear strength.	Moderate if slope is 6 to 12 percent, severe if 12 to 20 percent; moderately permeable.	Low.
Severe: high water table	Severe: high water table	Very severe: high water table	Moderate,
Moderate: seasonal high water table; danger of frost heave.	Moderate: seasonal high water table.	Severe: seasonal high water table	Low to moderate.
Severe: high water table	Moderate: high water table; moderate bearing capacity.	Very severe: high water table	High.
Slight	Slight	Moderate if slope is 0 to 12 percent; danger of ground water contamination.	Low.
Slight if gently sloping, moderate if undulating.	Slight	Slight if slope is 2 to 6 percent, moderate if 6 to 12 percent, severe if 12 to 20 percent; moderately permeable.	Moderate.
Moderate: sloping; dolomite bedrock at a depth of 2 to 4 feet.	Moderate: dolomite bedrock at a depth of 2 to 4 feet.	Severe: dolomite bedrock at a depth of 2 to 4 feet.	Low.
Moderate: dolomite bedrock at a depth of 1 to 2 feet; sloping.	Moderate: dolomite bedrock at a depth of 1 to 2 feet.	Severe: dolomite bedrock at a depth of 1 to 2 feet.	Low.

TABLE 7.—*Engineering interpretations for*

Soil series and map symbols	Suitability as source of— Topsoil	Suitability as source of— Sand and gravel
Morley: MrB2, MrC2, MrD2	Surface layer good; subsoil poor, clayey	Unsuitable: very low sand and gravel content.
Muscatine:		
MsB2	Surface layer good; subsoil fair, erodible on slope.	Unsuitable: low sand and gravel content.
MtA	Surface layer good; subsoil fair, erodible on slope.	Unsuitable: low sand and gravel content.
MuA	Surface layer good; subsoil fair, erodible on slope.	Unsuitable: low sand and gravel content.
Myrtle: MyB2, MyC2	Surface layer good; subsoil fair, erodible on slope.	Unsuitable: very low sand and gravel content.
Navan: Na	Surface layer good; subsoil poor, high water table, clayey.	Unsuitable: very low sand and gravel content.
New Glarus:		
NgB2, NgC2, NgD2, NgE2	Surface layer good; subsoil fair, clayey	Unsuitable: very low sand and gravel content.
NlC3, NlD3	Poor: clayey	Unsuitable: very low sand and gravel content.
Northfield: NoB2, NoC2, NoD2, NoE2	Surface layer good; subsoil fair, thin over sandstone bedrock.	Fair: cemented sandstone bedrock
Ockley:		
OeA, OeB, OkA, OkB2, OkC2	Surface layer good; subsoil poor, clayey	Good
OcA	Surface layer fair; subsoil poor, clayey	Good
Ogle: OlB2, OlC2	Surface layer good; subsoil fair, clayey	Unsuitable: very low sand and gravel content.
Orion: OnA, Or	Good: subject to flooding	Unsuitable: very low sand and gravel content.
Oshtemo: OsA, OsB2, OsC2	Poor: sandy; droughty; erodible	Good
Ossian: Ot	Surface layer good; subsoil poor, clayey, high water table.	Unsuitable: very low sand and gravel content.
Otter: Ou	Good	Unsuitable: very low sand and gravel content.

See footnotes at end of table.

civil engineering and public roads—Continued

Degree and kind of limitation for—			Corrosion potential for uncoated steel [2]
Highway location [1]	Foundations for low buildings [1]	Septic tank filter fields	
Severe: moderate shrink-swell potential; low bearing capacity.	Moderate: moderate shrink-swell potential and bearing capacity; fair shear strength.	Severe: moderately slowly permeable.	Moderate.
Moderate: seasonal high water table; danger of frost heave.	Moderate: moderate bearing capacity and compressibility; fair shear strength; seasonal high water table.	Severe: seasonal high water table.	Low.
Moderate: seasonal high water table; danger of frost heave; stable in underlying sand.	Moderate: moderate bearing capacity and compressibility; fair shear strength; seasonal high water table; high bearing capacity in underlying sand.	Severe: seasonal high water table.	Low.
Moderate: seasonal high water table; danger of frost heave; fair stability in underlying loam.	Moderate: moderate bearing capacity and compressibility; fair shear strength; seasonal high water table; moderate bearing capacity in underlying loam.	Severe: seasonal high water table.	Low.
Moderate: moderate frost heave	Slight	Slight if slope is 2 to 6 percent, moderate if 6 to 12 percent; moderately permeable.	Moderate.
Severe: high water table; low stability.	Very severe: fair shear strength; moderate compressibility and bearing capacity; high water table.	Very severe: high water table	High.
Severe: 2 to 4 feet to dolomite bedrock; plastic.	Severe: 2 to 4 feet to dolomite bedrock.	Severe: dolomite bedrock at a depth of 2 to 4 feet; danger of ground water contamination.	Moderate.
Severe: 2 to 4 feet to dolomite bedrock.	Severe: 2 to 4 feet to dolomite bedrock.	Severe: 2 to 4 feet to dolomite bedrock; danger of ground water contamination.	Moderate.
Moderate: sandstone bedrock at a depth of less than 2 feet.	Moderate: sandstone bedrock at a depth of less than 2 feet.	Moderate: danger of ground water contamination.	Low.
Slight if nearly level, moderate if steeper.	Slight	Moderate: danger of ground water contamination.	Low to moderate.
Slight if nearly level, moderate if steeper.	Slight	Moderate: danger of ground water contamination.	Low to moderate.
Moderate: moderate frost heave	Slight	Slight if slope is 2 to 6 percent, moderate if 6 to 12 percent; moderately permeable.	Moderate.
Severe: subject to flooding; danger of frost heave.	Severe: subject to frost heave; low bearing capacity; moderate compressibility; subject to flooding.	Very severe: subject to flooding	Low.
Slight if nearly level	Slight	Moderate if slope is 0 to 12 percent; danger of ground water contamination.	Low.
Severe: highly plastic; high water table; high frost heave.	Severe: high water table; moderate bearing capacity.	Very severe: high water table	High.
Severe: subject to flooding; high frost heave.	Severe: subject to flooding; moderate bearing capacity; seasonal high water table.	Very severe: frequent flooding; high water table.	Moderate.

TABLE 7.—*Engineering interpretations for*

Soil series and map symbols	Suitability as source of— Topsoil	Suitability as source of— Sand and gravel
Palms: Pa	Poor: erodible; oxidizes rapidly.	Unsuitable: high water table; low content of clean sand or gravel in substratum.
Palsgrove: PgB2, PgC2, PgD2, PlD3	Surface layer good; subsoil fair, clayey, erodible.	Unsuitable: very low sand and gravel content.
Pecatonica: PnB2, PnC2, PnD2	Surface layer good; subsoil fair, erodible on slope.	Unsuitable: very low sand and gravel content.
Pillot: PoA, PoB2, PoC2	Surface layer good; subsoil fair, thin, erodible on slope.	Good
Plainfield: PrB2	Poor: sandy; erodible on slope	Good
Riverwash: Rh	Unsuitable: mostly sand and gravel	Good
Rockton: RkC2, RkD2, RnB2, RnC2	Surface layer good; subsoil fair, thin over bedrock.	Unsuitable: very low sand and gravel content.
Rodman: RoC, RoE	Surface layer fair, thin; subsoil unsuitable, gravelly.	Good
Saybrook: SaB2, SaC2	Surface layer good; subsoil fair, clayey	Poor: pockets of well-graded sand and gravel.
Saylesville: ScB2	Surface layer good; subsoil poor, clayey, unstable on slope.	Unsuitable: very low sand and gravel content.
Sebewa: Se	Surface layer good; subsoil poor, high water table, clayey.	Fair: poorly graded sand and gravel; high water table.
Shiffer: SfA	Surface layer good; subsoil fair, thin over loose sand.	Good
Sogn: SoC, SoE	Fair: shallow over bedrock	Unsuitable: no sand or gravel
Steep stony and rocky land: Sp	Poor: shallow; stony	Fair: stony; cemented sandstone
Stronghurst: SsB, StA, SuA	Surface layer good; subsoil fair, clayey, erodible on slope.	Unsuitable: very low sand and gravel content.
Sylvester: SyB2, SyC2	Surface layer good; subsoil fair, erodible on slope.	Good
Tama: TaB2, TaC2, TbA, TbB	Surface layer good; subsoil fair, clayey, erodible on slope.	Unsuitable: very low sand and gravel content.
Tell: TcA, TcB2, TcC2	Surface layer good; subsoil fair, thin over sand, erodible on slope.	Good
Terrace escarpments: Te	Poor: droughty; gravelly	Good

See footnotes at end of table.

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Degree and kind of limitation for—			Corrosion potential for uncoated steel [2]
Highway location [1]	Foundations for low buildings [1]	Septic tank filter fields	
Very severe: very poor stability; very low bearing capacity.	Very severe: organic soil has very low bearing capacity. Lower substratum has fair shear strength and moderate compressibility; high water table.	Very severe: high water table	High.
Moderate: plastic; moderate frost heave.	Moderate: clay has high shrink-swell potential; fair shear strength.	Moderate: moderately slow permeability.	Low.
Moderate: plastic; moderate frost heave.	Slight	Slight if slope is 2 to 6 percent, moderate if 6 to 12 percent, severe if 12 to 20 percent; moderately permeable.	Moderate.
Moderate: moderate frost heave	Slight	Moderate: danger of ground water contamination.	Low.
Moderate: loose sand; subject to blowing.	Slight	Moderate: danger of ground water contamination.	Low.
Slight	Severe: frequent severe flooding; high water table.	Very severe: high water table; frequent severe flooding.	Low.
Severe: dolomite bedrock at a depth of 2 to 4 feet.	Severe: dolomite bedrock at a depth of 2 to 4 feet.	Severe: excavation difficult; danger of ground water contamination.	Low.
Moderate: stones hinder hauling and grading.	Slight	Moderate if slope is 2 to 12 percent, severe if 12 to 30 percent; danger of ground water contamination.	Low.
Slight	Slight	Slight if slope is 0 to 6 percent, moderate if 6 to 12 percent; moderately permeable.	Moderate.
Severe: moderate frost heave; poor stability; plastic subsoil.	Moderate: moderate shrink-swell potential and bearing capacity; fair shear strength.	Moderate: moderately slowly permeable.	High.
Severe: high water table	Severe: high water table	Very severe: high water table	High.
Moderate: seasonal high water table	Moderate: seasonal high water table; liquefies easily.	Severe: seasonal high water table	Low.
Severe: less than 20 inches to dolomite bedrock.	Severe: dolomite bedrock at a depth of less than 20 inches.	Severe: less than 20 inches to dolomite bedrock.	Moderate.
Severe: sandstone or dolomite outcrops; steep slopes.	Very severe: sandstone or dolomite outcrops; steep slopes.	Very severe: stony; steep slopes	Low.
Moderate: seasonal high water table; moderate frost heave.	Moderate: moderate bearing capacity; fair shear strength; seasonal high water table.	Severe: seasonal high water table	Low.
Moderate: 2 to 4 feet to sandstone bedrock; moderate frost heave.	Slight	Moderate: danger of ground water contamination.	Low.
Moderate: moderate frost heave	Moderate: moderate bearing capacity and compressibility; fair shear strength.	Slight if slope is 0 to 6 percent, moderate if 6 to 12 percent; moderately permeable.	Low.
Slight if nearly level, moderate if steeper; moderate frost heave.	Slight	Moderate if slope is 0 to 12 percent; danger of ground water contamination.	Low.
Moderate: steep slopes	Moderate: steep slopes	Severe: steep slopes	Low to moderate.

TABLE 7.—*Engineering interpretations for*

Soil series and map symbols	Suitability as source of—	
	Topsoil	Sand and gravel
Thackery: ThA	Surface layer good; subsoil poor, clayey	Good
Wallkill: Wa	Surface layer good; subsoil poor, organic soil oxidizes rapidly.	Unsuitable: very low sand and gravel content.
Westville: WdC2, WeB2, WeC2, WeD2	Surface layer good; subsoil fair, clayey	Poor: pockets of well-graded sand and gravel.
Whalan: WhB2, WhC2, WlB2, WlC2, WlD2.	Surface layer good; subsoil fair to poor, thin over bedrock.	Unsuitable: very low sand and gravel content.
Winnebago: WnB2, WnC2	Surface layer good; subsoil fair, clayey	Poor: small pockets of well-graded sand and gravel.

[1] Engineers and others should not apply specific values to the estimates given for bearing capacity.

TABLE 8.—*Engineering interpretations*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils for referring to other series that

Soil series and map symbols	Soil features affecting—	
	Reservoir areas	Embankments
Adrian: Ac	Pervious; high water table; suitable for dug ponds.	Organic surface layer has poor stability; substratum has good stability but is susceptible to piping.
Alluvial land:		
Ad	Pervious; high water table; suitable for dug ponds; subject to flooding.	Good stability; susceptible to piping
Ae	Pervious; high water table; frequently flooded.	Susceptible to piping; frequently flooded
Arenzville: An	Pervious to semipervious; subject to flooding.	Pervious to impervious; fair to poor stability
Arland: ArB2, ArC2, ArD2	Pervious to semipervious subsoil.	Semipervious to impervious; subsoil has fair stability; substratum has good stability.
Ashdale: AsB2, AsC2, AsD2	Pervious to semipervious; substratum is slowly permeable clay over fractured dolomite.	Semipervious to impervious; fair stability and moderate shrink-swell potential in subsoil; poor stability and high shrink-swell potential in underlying clay.
Billett: BlA, BlB2, BlC2	Pervious subsoil	Pervious to semipervious; good stability; susceptible to piping.
Boone: BoD	Very pervious	Pervious; poor stability; low shrink-swell potential

civil engineering and public roads—Continued

Degree and kind of limitation for—			Corrosion potential for uncoated steel [2]
Highway location [1]	Foundations for low buildings [1]	Septic tank filter fields	
Moderate: seasonal high water table.	Moderate: seasonal high water table.	Very severe: seasonal high water table.	Low to moderate.
Very severe: high water table; high frost heave.	Very severe: high frost heave; low bearing capacity; high water table.	Very severe: high water table.	High.
Slight.	Slight.	Slight if slope is 0 to 6 percent, moderate if 6 to 12 percent; moderately permeable.	Low to moderate.
Moderate if nearly level, severe if steeper; dolomite bedrock at a depth of 2 to 4 feet.	Severe: dolomite bedrock at a depth of 2 to 4 feet.	Severe: dolomite bedrock at a depth of 2 to 4 feet.	Low.
Slight.	Slight.	Slight if slope is 2 to 6 percent, moderate if 6 to 12 percent; moderately permeable.	Low.

[2] The corrosion potential for concrete is rated "low" for all soils.

for farm uses

in such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions appear in the first column of this table]

Soil features affecting—Continued			
Agricultural drainage	Irrigation	Terraces and diversions	Grassed waterways
Moderately rapid permeability; high water table.	Rapid water intake rate; high water table.	Nearly level; high water table.	Highly erodible; high water table.
Subject to flooding.	Moderate to rapid water intake rate; subject to flooding.	Nearly level; subject to flooding.	Subject to flooding.
Rapid permeability; stratified; subject to flooding; high water table.	Moderate to rapid water intake rate; high water table; frequent flooding.	Nearly level; high water table; frequent flooding.	Frequent flooding; high water table.
Moderately permeable; subject to flooding.	Moderate water intake rate; high available water capacity; subject to flooding.	Nearly level; subject to flooding.	Subject to flooding.
Drainage adequate.	Moderate water intake rate; medium available water capacity; gently sloping to moderately steep.	Sandy substratum; subject to to erosion; gently sloping to moderately steep.	Sandy substratum.
Drainage adequate.	Moderate water intake rate; high available water capacity; gently sloping to moderately steep.	Gently sloping to moderately steep.	Gently sloping to moderately steep.
Drainage excessive.	Moderately rapid water intake rate; medium available water capacity; nearly level to sloping.	Sandy; erodible; nearly level to sloping.	Low fertility; blows easily.
Drainage excessive.	Very rapid water intake rate; very low available water capacity; subject to blowing.	Low stability; vegetative cover difficult to establish; subject to blowing.	Sandy; severe blowing.

TABLE 8.—*Engineering interpretations*

Soil series and map symbols	Soil features affecting—	
	Reservoir areas	Embankments
Brookston: Br	Pervious to semipervious; high water table.	Semipervious to impervious; fair stability; moderate shrink-swell potential; stony in places.
Cadiz: CdB2, CdC2	Semipervious substratum	Impervious; poor stability; high shrink-swell potential
*Chaseburg: ChB, ChC, Cn. For Arenzville part of Cn, see Arenzville series.	Pervious to semipervious	Semipervious to impervious; poor stability; moderate shrink-swell potential.
Colwood: Co	Pervious to semipervious; high water table.	Semipervious to impervious; poor stability; moderate shrink-swell potential; susceptible to piping.
Dakota: DaA, DaB2	Pervious to semipervious subsoil.	Semipervious to impervious; fair stability
Dells: DbA	Pervious to semipervious subsoil.	Semipervious to impervious subsoil; subsoil has fair stability and moderate shrink-swell potential; substratum has good stability; susceptible to piping.
Del Rey: Dc	Seasonal high water table; impervious.	Impervious; fair stability; high shrink-swell potential in clayey substratum.
Dickinson: DdA	Pervious; rapid permeability in substratum.	Semipervious and fair stability in subsoil; susceptible to piping; poor stability in substratum.
Dodge: DeB2, DeC2	Pervious to semipervious	Semipervious to impervious; subsoil has fair stability; moderate shrink-swell potential; substratum has high stability.
Dodgeville: DgB2, DgC2, DgC3, DgD2	Pervious to semipervious; 20 to 40 inches to dolomite bedrock.	Semipervious to impervious; fair to poor stability; clay substratum has high shrink-swell potential.
Downs:		
DoB2, DoC2	Pervious to semipervious	Semipervious to impervious; fair stability; moderate shrink-swell potential.
DsA, DsB, DsB2, DsC2	Impervious to semipervious substratum.	Semipervious to impervious; fair stability; moderate shrink-swell potential.
Dunbarton: DuB2, DuC2, DuD2, DuE2, DvD3.	Pervious to semipervious; less than 20 inches to dolomite bedrock.	Semipervious to impervious; fair stability; clayey residuum has high shrink-swell potential; very shallow.
Durand: DwB2, DwC2	Pervious to semipervious	Semipervious to impervious; subsoil has fair stability and moderate shrink-swell potential; substratum has good stability.
Edmund: EdB2, EdC2, EdD2	Pervious to semipervious; less than 20 inches to dolomite bedrock.	Semipervious to impervious; fair stability; clayey residuum has high shrink-swell potential.
Eleva: EeC2, EeD2	Pervious	Pervious to semipervious; good stability; susceptible to piping.

for farm uses—Continued

Soil features affecting—Continued			
Agricultural drainage	Irrigation	Terraces and diversions	Grassed waterways
Moderate permeability; high water table; surface and subsurface drainage feasible.	Moderate water intake rate; high water table.	High water table; nearly level.	High water table.
Drainage adequate	Moderately slow water intake rate; high moisture capacity; gently sloping to sloping.	Moderately slow permeability; gently sloping to sloping.	Clayey subsoil; gently sloping to sloping.
Drainage adequate	Moderate water intake rate; subject to flooding.	Gently sloping and sloping; subject to flooding.	Subject to flooding.
Moderately permeable; high water table.	Moderate water intake rate; high water table.	Nearly level; high water table.	Highly erodible; high water table.
Drainage adequate	Moderate water intake rate; medium available water capacity; nearly level and gently sloping.	Sandy substratum; erodible.	Nearly level and gently sloping.
Seasonal high water table	Moderate water intake rate; medium available water capacity; seasonal high water table.	Seasonal high water table.	Seasonal high water table.
Moderately slow permeability; seasonal high water table.	Moderately slow water intake rate; high available water capacity; seasonal high water table.	Seasonal high water table; nearly level; dense clayey subsoil; construction difficult.	Clayey subsoil.
Drainage adequate	Rapid water intake rate; low available water capacity; gently sloping or nearly level.	Sandy substratum; erodible; blows easily; gently sloping.	Sandy loam; blows easily.
Drainage adequate	Moderate water intake rate; high available water capacity; gently sloping and sloping.	Gently sloping and sloping; moderately permeable.	Moderately high fertility; moderately permeable.
Drainage adequate	Moderate water intake rate; medium available water capacity; gently sloping to moderately steep.	Dolomite bedrock at a depth of 20 to 40 inches; gently sloping to moderately steep.	Clayey subsoil; gently sloping to moderately steep.
Drainage adequate	Moderate water intake rate; high available water capacity; gently sloping and sloping.	Gently sloping and sloping.	High fertility; moderate permeability.
Drainage adequate	Moderate water intake rate; high available water capacity; nearly level to sloping.	Nearly level to sloping.	High fertility; moderate permeability.
Drainage adequate	Moderately slow water intake rate; low available water capacity; gently sloping to steep.	Less than 20 inches to dolomite bedrock; gently sloping to steep.	Clayey subsoil; steep slopes; less than 20 inches to dolomite bedrock.
Drainage adequate	Moderate water intake rate; high available water capacity; gently sloping to sloping.	Moderate permeability; gently sloping to sloping.	High fertility; moderate permeability.
Drainage adequate	Moderately slow water intake rate; low available water capacity; gently sloping to steep.	Less than 20 inches to dolomite bedrock.	Steep slopes; clayey subsoil; less than 20 inches to dolomite bedrock.
Drainage adequate	Moderately rapid water intake rate; medium available water capacity; sloping and moderately steep.	Sandy; highly erodible; sloping and moderately steep.	Low fertility; sandy.

TABLE 8.—*Engineering interpretations*

Soil series and map symbols	Soil features affecting—	
	Reservoir areas	Embankments
Elkmound: ElB2, ElC2, ElD2, ElE2, ElF	Pervious; less than 20 inches to sandstone bedrock.	Subsoil has poor stability; substratum has high stability
Ettrick: Et	Pervious to semipervious; high water table; subject to flooding.	Semipervious to impervious; fair stability; moderate shrink-swell potential.
Fayette:		
FaB2, FaC2, FaD2, FcB2, FcC2, FcD2	Pervious to semipervious	Semipervious to impervious; fair stability; moderate shrink-swell potential.
FbA, FbB2, FbC	Pervious to semipervious	Semipervious to impervious; fair stability; moderate shrink-swell potential.
FeC2, FeD2	Pervious to semipervious	Semipervious to impervious; fair stability; moderate shrink-swell potential; substratum susceptible to piping.
Flagg: FlA, FlB2, FlC2	Pervious to semipervious	Semipervious to impervious; subsoil has fair stability and moderate shrink-swell potential; loamy substratum has good stability and is pervious.
Fox:		
FoA, FoB2, FoC2	Pervious to semipervious; rapid permeability in substratum.	Semipervious to impervious subsoil; good stability; very pervious substratum.
FnC2, FnD2	Pervious to semipervious; rapid permeability in substratum.	Semipervious subsoil; good stability; very pervious substratum.
FsA, FsB2	Pervious to semipervious; rapid permeability in substratum.	Semipervious to impervious subsoil; good stability; very pervious substratum.
Gale: GaB2, GaC2, GaD2, GaE2	Pervious to semipervious; rapid permeability in substratum.	Semipervious to impervious subsoil; subsoil has fair stability and moderate shrink-swell potential; subtratum has good stability.
Gotham: GoA, GoB2, GoC2	Pervious	Pervious to semipervious; good stability; susceptible to piping.
Griswold: GrB2, GrC2	Pervious to semipervious subsoil	Semipervious to impervious; good stability; some areas are stony.
Hebron:		
HbA, HbB2	Impervious to semipervious	Semipervious to impervious; poor stability; moderate shrink-swell potential; susceptible to piping.
HeA	Semipervious subsoil; impervious to semipervious substratum.	Semipervious to impervious subsoil and substratum; subtratum has poor stability and moderate shrink-swell potential.

for farm uses—Continued

Soil features affecting—Continued			
Agricultural drainage	Irrigation	Terraces and diversions	Grassed waterways
Drainage excessive	Moderately rapid water intake rate; low available water capacity; gently sloping to very steep.	Less than 20 inches to sandstone bedrock; gently sloping to very steep.	Less than 20 inches to sandstone bedrock.
Moderately slow permeability; high water table; subject to flooding.	Moderate water intake rate; high available water capacity; subject to flooding; high water table.	Nearly level; subject to flooding; high water table.	High water table; subject to flooding.
Drainage adequate	Moderate water intake rate; high available water capacity; gently sloping to moderately steep.	Gently sloping to moderately steep; moderate permeability.	Gently sloping to moderately steep; moderate permeability.
Drainage adequate	Moderate water intake rate; high available water capacity; nearly level to sloping.	Nearly level to sloping	Nearly level to sloping.
Drainage adequate	Moderate water intake; high available water capacity; sloping and moderately steep.	Sloping and moderately steep; moderate permeability.	Sloping and moderately steep; moderate permeability.
Drainage adequate	Moderate water intake rate; high available water capacity; nearly level to sloping.	Nearly level to sloping; moderate permeability.	Nearly level to sloping; moderate permeability.
Drainage adequate	Moderate water intake rate; medium available water capacity; nearly level to sloping.	Nearly level to sloping; moderately permeable; sand and gravel at a depth of 20 to 40 inches.	Gravel substratum; nearly level to sloping; moderately permeable.
Drainage adequate	Moderate water intake rate; medium available water capacity; sloping and moderately steep.	Sandy surface subject to erosion; sloping and moderately steep; sand and gravel at a depth of 20 to 40 inches.	Gravelly substratum; sloping and moderately steep.
Drainage adequate	Moderate water intake rate; medium available water capacity; nearly level and gently sloping.	Nearly level and gently sloping; moderately permeable; sand and gravel at a depth of 20 to 40 inches.	Gravelly substratum; nearly level and gently sloping.
Drainage adequate	Moderate water intake rate; medium available water capacity; gently sloping to steep.	Moderately permeable; gently sloping to steep.	Sandy substratum.
Drainage excessive	Rapid water intake rate; low available water capacity; subject to blowing; nearly level to sloping.	Sandy; blows easily; nearly level to sloping.	Low fertility; blows easily; nearly level to sloping.
Drainage adequate	Moderate water intake rate; high available water capacity; gently sloping to sloping.	Stony or sandy loam substratum; gently sloping and sloping; highly erodible.	Stony substratum; gently sloping and sloping.
Drainage adequate	Moderately slow water intake rate; high available water capacity; nearly level and gently sloping.	Nearly level and gently sloping; moderately slow permeability.	Nearly level and gently sloping.
Moderately slow permeability; seasonal high water table.	Moderately slow water intake rate; high available water capacity; seasonal high water table.	Nearly level; seasonal high water table.	Seasonal high water table.

TABLE 8.—*Engineering interpretations*

Soil series and map symbols	Soil features affecting—	
	Reservoir areas	Embankments
Hixton: HmB2, HmC2	Pervious at a depth of 20 to 40 inches.	Semipervious; good stability; susceptible to piping.
Houghton: Hu	Pervious; high water table; dug ponds feasible.	Pervious; poor stability; organic; not suitable for other than low embankments.
Huntsville: HvA, HvB	Pervious to semipervious	Semipervious to impervious; fair stability; moderate shrink-swell potential.
Juda: JuB2, JuC2	Semipervious	Impervious; poor stability; moderate shrink-swell potential.
Lamartine: LaB	Pervious to semipervious	Semipervious to impervious; subsoil has fair stability and moderate shrink-swell potential; substratum has good stability.
Lawler: LeA, LlA	Pervious to semipervious subsoil; pervious substratum.	Semipervious to impervious; good stability
Lindstrom: LnC2, LnD2, LsC, LsD2	Pervious to semipervious	Semipervious; subsoil and substratum have fair stability and moderate shrink-swell potential; susceptible to piping.
Marshan: Mb, Mc	Pervious to semipervious subsoil; high water table; sand and gravel at a depth of 20 to 40 inches.	Semipervious subsoil; fair stability; moderate shrink-swell potential.
Matherton: Md	Pervious to semipervious subsoil; sand and gravel at a depth of 20 to 40 inches.	Semipervious to impervious subsoil; good stability; very pervious substratum.
Maumee: Me	Pervious; high water table; dug ponds feasible.	Pervious; poor stability; susceptible to piping
Meridian: MlA, MlB2, MlC2	Pervious to semipervious subsoil	Semipervious to impervious; fair to good stability
Miami: MmB2, MmC2, MmD2	Pervious to semipervious	Semipervious to impervious subsoil; subsoil has fair stability and moderate shrink-swell potential; substratum has good stability.
Mifflin:		
MnC2, MnD2	Pervious; less than 4 feet to dolomite bedrock.	Semipervious; fair stability; clayey residuum has moderate shrink-swell potential.
MoC2, MoD2	Pervious; less than 20 inches to dolomite bedrock.	Semipervious; good stability; clayey residuum has moderate shrink-swell potential.
Morley: MrB2, MrC2, MrD2	Semipervious subsoil	Impervious; susboil has poor stability; high shrink-swell potential; substratum has fair to good stability.

for farm uses—Continued

Soil features affecting—Continued			
Agricultural drainage	Irrigation	Terraces and diversions	Grassed waterways
Drainage adequate	Moderate water intake rate; medium available water capacity; gently sloping and sloping.	Sandy substratum; highly erodible; gently sloping and sloping.	Sandy substratum; gently sloping and sloping.
Moderately rapidly permeable; high water table; subsurface drains feasible.	Rapid water intake rate; high water table.	Nearly level; high water table	Highly erodible; high water table.
Subject to stream overflow; drainage adequate; dikes feasible.	Moderate water intake rate; subject to flooding.	Nearly level; subject to flooding	Subject to flooding.
Drainage adequate	Moderately slow water intake rate; gently sloping and sloping.	Gently sloping and sloping; moderately slow permeability.	Gently sloping and sloping.
Moderate permeability; seasonal high water table; subsurface or surface drainage feasible.	Moderate water intake rate; seasonal high water table; gently sloping.	Seasonal high water table; gently sloping.	Seasonal high water table.
Moderate permeability; seasonal high water table.	Moderate water intake rate; seasonal high water table.	Nearly level; seasonal high water table.	Sandy substratum; seasonal high water table.
Drainage adequate	Moderately rapid water intake rate; high available water capacity; sloping and moderately steep.	Moderately permeable; sloping and moderately steep; sandy loam surface blows easily.	Sandy surface blows easily.
Moderate permeability; high water table; substratum generally unstable.	Moderate water intake rate; high water table.	Nearly level; high water table; sand and gravel at a depth of 20 to 40 inches.	Sandy substratum; high water table.
Moderate permeability; seasonal high water table.	Moderate water intake rate; seasonal high water table.	Nearly level; seasonal high water table; sand and gravel at a depth of 20 to 40 inches.	Gravelly substratum; seasonal high water table.
Moderately rapid permeability; high water table; substratum generally unstable.	Moderately rapid water intake rate; low available water capacity; high water table.	Nearly level; high water table	High water table; sandy; difficult to vegetate and stabilize.
Drainage adequate	Moderate water intake rate; medium available water capacity; nearly level to sloping.	Sandy substratum; erodible; nearly level to sloping.	Sandy substratum; nearly level to sloping.
Drainage adequate	Moderate water intake rate; gently sloping to moderately steep.	Substratum stony in places; gently sloping to moderately steep; highly calcareous in substratum at a depth of 20 to 40 inches.	Gently sloping to moderately steep.
Drainage adequate	Moderate water intake rate; medium available water capacity; sloping and moderately steep.	Less than 4 feet to dolomite bedrock; clayey subsoil hinders construction in places.	Sloping and moderately steep.
Drainage adequate	Moderate water intake rate; low available water capacity; sloping to moderately steep.	Less than 20 inches to dolomite bedrock; sloping to moderately steep.	Less than 20 inches to dolomite bedrock; sloping to moderately steep.
Drainage adequate	Moderately slow water intake rate; high available water capacity; gently sloping to moderately steep.	Gently sloping to moderately steep; moderately slow permeability; clayey subsoil hinders construction in places.	Clayey substratum; gently sloping to moderately steep.

TABLE 8.—*Engineering interpretations*

Soil series and map symbols	Soil features affecting—	
	Reservoir areas	Embankments
Muscatine:		
MsB2	Pervious to semipervious	Semipervious to impervious; fair stability; moderate shrink-swell potential.
MtA	Pervious to semipervious; unrestricted drainage in underlying sand.	Semipervious to impervious; fair stability; moderate shrink-swell potential.
MuA	Pervious to semipervious	Semipervious to impervious; fair stability; moderate shrink-swell potential.
Myrtle: MyB2, MyC2	Pervious to semipervious	Semipervious to impervious; subsoil has fair stability and moderate shrink-swell potential; loamy substratum has good stability.
Navan: Na	Pervious to semipervious; high water table; impervious substratum.	Semipervious to impervious; fair stability; moderate shrink-swell potential.
New Glarus: NgB2, NgC2, NgD2, NgE2, NIC3, NID3.	Pervious to semipervious; less than 40 inches to dolomite bedrock.	Semipervious to impervious; fair stability; high shrink-swell potential in clayey residuum.
Northfield: NoB2, NoC2, NoD2, NoE2	Pervious; less than 20 inches to sandstone bedrock; rapid permeability in bedrock.	Pervious; subsoil has fair stability and low shrink-swell potential; substratum has poor stability.
Ockley:		
OeA, OeB, OkA, OkB2, OkC2	Pervious to semipervious; substratum is sand and gravel.	Semipervious to impervious subsoil; subsoil has fair stability and moderate shrink-swell potential; substratum has good stability.
OcA	Pervious to semipervious; substratum is sand and gravel.	Semipervious to impervious subsoil; subsoil has fair stability and moderate shrink-swell potential; substratum has good stability.
Ogle: OIB2, OIC2	Pervious to semipervious	Semipervious to impervious; subsoil has fair stability and moderate shrink-swell potential; substratum has good stability.
Orion:		
OnA	Pervious to semipervious; frequently flooded.	Semipervious to impervious; poor stability; moderate shrink-swell potential; susceptible to piping.
Or	Pervious to semipervious; high water table.	Semipervious to impervious; poor stability; moderate shrink-swell potential; susceptible to piping.
Oshtemo: OsA, OsB2, OsC2	Pervious	Pervious, good stability
Ossian: Ot	Pervious to semipervious; high water table.	Semipervious to impervious; fair stability; moderate shrink-swell potential; susceptible to piping.
Otter: Ou	Pervious to semipervious	Semipervious; poor stability; moderate shrink-swell potential; high organic-matter content.
Palms: Pa	Pervious; high water table; dug ponds feasible.	Pervious; organic soil has poor stability; substratum has fair to poor stability.

for farm uses—Continued

Soil features affecting—Continued			
Agricultural drainage	Irrigation	Terraces and diversions	Grassed waterways
Moderately slow permeability; seasonal high water table; subsurface drainage feasible.	Moderate water intake rate; high available water capacity; seasonal high water table.	Nearly level; seasonal high water table.	Seasonal high water table.
Moderately permeable; seasonal high water table; subsurface drainage feasible.	Moderate water intake rate; high available water capacity; seasonal high water table.	Nearly level; seasonal high water table.	Seasonal high water table.
Moderately permeable; seasonal high water table; subsurface drainage feasible.	Moderate water intake rate; high available water capacity; seasonal high water table.	Nearly level; seasonal high water table.	Seasonal high water table.
Drainage adequate	Moderate water intake rate; high available water capacity; gently sloping and sloping.	Gently sloping and sloping; moderate permeability.	Gently sloping and sloping.
Moderately slow permeability; high water table; surface and subsurface drainage feasible.	Low water intake rate; high available water capacity; high water table.	Nearly level; high water table	High water table.
Drainage adequate	Moderate water intake rate; medium available water capacity; gently sloping to steep.	Dolomite bedrock at a depth of less than 40 inches; gently sloping to steep.	Clayey subsoil; gently sloping to steep.
Drainage adequate	Moderate water intake rate; low available water capacity; gently sloping to steep.	Less than 20 inches to sandstone bedrock; gently sloping to steep.	Less than 20 inches to sandstone bedrock; gently sloping to steep.
Drainage adequate	Moderate water intake rate; high available water capacity; nearly level to sloping.	Moderate permeability; nearly level to sloping.	Nearly level to sloping.
Drainage adequate	Moderately rapid water intake rate; high available water capacity; nearly level.	Sandy loam blows easily; nearly level.	Moderately erodible; difficult to vegetate.
Drainage adequate	Moderate water intake rate; high available water capacity; gently sloping and sloping.	Moderately permeable; gently sloping and sloping.	Gently sloping and sloping.
Moderate permability; frequently flooded; seasonal high water table; dikes and surface drains feasible.	Moderate water intake rate; high available water capacity; seasonal high water table; frequently flooded.	Nearly level; seasonal high water table; frequently flooded.	Seasonal high water table; frequently flooded.
Moderately slow permeability; subject to overflow; high water table.	Moderate water intake rate; high available water capacity; subject to flooding: high water table.	Nearly level; high water table; frequently flooded.	Frequent flooding; high water table.
Drainage excessive	Moderately rapid water intake rate; medium available water capacity; hazard of blowing; nearly level to sloping.	Blows easily; nearly level to sloping.	Blows easily.
Moderately slow permeability; high water table.	Moderate water intake rate; high available water capacity; high water table.	Nearly level; high water table	High water table.
Moderate permeability; subject to flooding; seasonal high water table.	Moderate water intake rate; high available water capacity; high water table; subject to flooding.	Nearly level; subject to flooding; high water table.	High water table; subject to flooding.
Moderately rapid permeability; high water table; subsurface or surface drainage feasible.	Moderately rapid water intake rate; high available water capacity.	Nearly level; high water table	High water table.

TABLE 8.—*Engineering interpretations*

Soil series and map symbols	Soil features affecting— Reservoir areas	Soil features affecting— Embankments
Palsgrove: PgB2, PgC2, PgD2, PlD3	Pervious to semipervious; fractured dolomite at a depth of 4 to 6 feet.	Semipervious to impervious; fair stability; clay substratum has high shrink-swell potential.
Pecatonica: PnB2, PnC2, PnD2	Pervious to semipervious; moderate permeability in substratum.	Semipervious to impervious; subsoil has fair stability and moderate shrink-swell potential; loamy substratum has good stability.
Pillot: PoA, PoB2, PoC2	Pervious to semipervious subsoil; rapid permeability at a depth of 20 to 40 inches.	Semipervious to impervious; subsoil has fair stability and moderate shrink-swell potential; substratum has good stability.
Plainfield: PrB2	Pervious	Pervious; good stability; subject to piping
Riverwash: Rh	Variable; frequent flooding	Pervious; good stability; frequent flooding
Rockton: RkC2, RkD2, RnB2, RnC2	Pervious to semipervoius subsoil; less than 3 feet to dolomite bedrock.	Semipervious to impervious subsoil; fair stability and moderate shrink-swell potential; clay substratum has high shrink-swell potential.
Rodman: RoC, RoE	Very pervious	Good stability; very pervious
Saybrook: SaB2, SaC2	Pervious to semipervious	Semipervious to impervious; subsoil has fair stability and moderate shrink-swell potential; substratum has good stability.
Saylesville: ScB2	Semipervious to impervious; impervious substratum.	Semipervious to impervious; poor stability; moderate shrink-swell potential.
Sebewa: Se	Pervious to semipervious subsoil; high water table; sand and gravel at a depth of 20 to 40 inches.	Semipervious to impervious subsoil; subsoil has fair stability and moderate shrink-swell potential; substratum has good stability and is very pervious.
Shiffer: SfA	Pervious to semipervious	Semipervious to impervious; fair to good stability
Sogn: SoC, SoE	Pervious to semipervious; 20 inches to dolomite bedrock.	Semipervious to impervious; fair stability and moderate shrink-swell potential; less than 20 inches to dolomite bedrock.
Steep stony and rocky land: Sp	Rock outcrops	Pervious; rock outcrops common

for farm uses—Continued

Soil features affecting—Continued			
Agricultural drainage	Irrigation	Terraces and diversions	Grassed waterways
Drainage adequate	Moderate water intake rate; high available water capacity; gently sloping to moderately steep.	Gently sloping to moderately steep.	Gently sloping to moderately steep.
Drainage adequate	Moderate water intake rate; high available water capacity; gently sloping to moderately steep.	Gently sloping to moderately steep.	Gently sloping to moderately steep.
Drainage adequate	Moderate water intake rate; medium available water capacity; nearly level to sloping.	Sandy substratum; nearly level to sloping.	Nearly level to sloping.
Drainage excessive	Very rapid water intake rate; low available water capacity; severe hazard of blowing.	Severe hazard of blowing; very difficult to stabilize.	Severe hazard of blowing; difficult to vegetate.
Rapidly permeable; subject to high water table and frequent flooding.	Very rapid water intake rate; very low water capacity; frequent flooding.	Frequent flooding; highly erodible.	Subject to frequent and severe flooding.
Drainage adequate	Moderate water intake rate; medium available water capacity; sloping and moderately steep.	Less than 3 feet to dolomite bedrock; sloping and moderately steep.	Less than 3 feet to dolomite bedrock; sloping and moderately steep.
Drainage excessive	Very rapid water intake rate; very low available water capacity; gently sloping to very steep.	Gently sloping to very steep	Very low available water capacity; gently sloping to very steep.
Drainage adequate	Moderate water intake rate; high available water capacity; gently sloping and sloping.	Gently sloping and sloping	Moderately high fertility; gently sloping and sloping.
Drainage adequate	Moderately slow water intake rate; gently sloping.	Gently sloping; clayey subsoil hinders construction in places.	Clayey subsoil.
Moderate permeability; high water table; gravelly substratum; drainage feasible.	Moderate water intake rate; high water table.	Nearly level; high water table; sand and gravel at a depth of 20 to 40 inches.	Sand and gravel substratum; high water table.
Moderate permeability; seasonal high water table; drainage feasible.	Moderate water intake rate; medium available water capacity; seasonal high water table.	Sandy substratum; seasonal high water table.	Sandy substratum; seasonal high water table.
Drainage adequate	Moderate water intake rate; low available water capacity; less than 20 inches to dolomite bedrock; gently sloping to steep.	Less than 20 inches to dolomite bedrock; gently sloping to steep.	Less than 20 inches to dolomite bedrock.
Drainage adequate	Low available water capacity; steep slopes.	Shallow to bedrock; many rock outcrops.	Shallow to bedrock; steep slopes.

TABLE 8.—*Engineering interpretations*

Soil series and map symbols	Soil features affecting— Reservoir areas	Soil features affecting— Embankments
Stronghurst:		
SsB	Pervious to semipervious	Semipervious to impervious; fair stability; moderate shrink-swell potential.
StA	Pervious to semipervious; substratum is very pervious sand.	Semipervious to impervious; fair stability and moderate shrink-swell potential; substratum has rapid permeability and poor stability.
SuA	Pervious to semipervious	Semipervious to impervious; fair stability; moderate shrink-swell potential.
Sylvester: SyB2, SyC2	Pervious to semipervious subsoil; less than 40 inches to sandstone bedrock.	Semipervious to impervious subsoil; subsoil has fair stability and moderate shrink-swell potential; substratum has good stability.
Tama:		
TaB2, TaC2	Pervious to semipervious	Semipervious to impervious; fair stability; moderate shrink-swell potential.
TbA, TbB	Pervious to semipervious; rapid permeability in substratum.	Semipervious to impervious; fair stability; moderate shrink-swell potential.
Tell: TcA, TcB2, TcC2	Pervious to semipervious subsoil; sand at a depth of 20 to 40 inches; seal blanket required.	Semipervious to impervious subsoil; subsoil has fair stability and moderate shrink-swell potential; subsubstratum has good stability and is susceptible to piping.
Terrace escarpments: Te	Pervious to semipervious	Pervious to semipervious; fair stability; moderate shrink-swell potential.
Thackery: ThA	Pervious to semipervious subsoil; seasonal high water table.	Semipervious to impervious subsoil; subsoil has fair stability and moderate shrink-swell potential; substratum has good stability.
Wallkill: Wa	Pervious; high water table	Semipervious; silty upper part has fair stability and moderate shrink-swell potential; organic substratum is pervious and has poor stability; moderate shrink-swell potential.
Westville: WdC2, WeB2, WeC2, WeD2	Pervious to semipervious subsoil.	Semipervious to impervious subsoil; fair stability and moderate shrink-swell potential in subsoil; loam substratum has good stability.
Whalan: WhB2, WhC2, WlB2, WlC2, WlD2.	Pervious to semipervious subsoil; dolomite bedrock at a depth of less than 40 inches.	Semipervious to impervious subsoil; fair stability; moderate shrink-swell potential.
Winnebago: WnB2, WnC2	Pervious to semipervious subsoil.	Semipervious to impervious subsoil; fair stability and moderate shrink-swell potential. Loam substratum has good stability.

for farm uses—Continued

Soil features affecting—Continued			
Agricultural drainage	Irrigation	Terraces and diversions	Grassed waterways
Moderate permeability; seasonal high water table; surface and subsurface drainage feasible.	Moderate water intake rate; high available water capacity; nearly level and gently sloping; somewhat poorly drained.	Seasonal high water table; nearly level and gently sloping; wetness hinders construction in places.	Seasonal high water table.
Moderate permeability; seasonal high water table.	Moderate water intake rate; high available water capacity; nearly level and gently sloping.	Seasonal high water table; nearly level and gently sloping.	Seasonal high water table.
Moderate permeability; seasonal high water table.	Moderate water intake rate; high available water capacity; nearly level and gently sloping.	Seasonal high water table; nearly level and gently sloping.	Seasonal high water table.
Drainage adequate	Moderate water intake rate; medium available water capacity; gently sloping and sloping.	Gently sloping and sloping; less than 40 inches to sandstone bedrock.	Less than 40 inches to sandstone bedrock.
Drainage adequate	Moderate water intake rate; high available water capacity; gently sloping and sloping.	Gently sloping and sloping	Gently sloping and sloping.
Drainage adequate	Moderate water intake rate; high available water capacity; gently sloping and sloping.	Gently sloping and sloping	Gently sloping and sloping.
Drainage adequate	Moderate water intake rate; medium available water capacity; nearly level to sloping.	Sandy substratum is highly erodible; gently sloping to sloping.	Sandy substratum.
Drainage adequate	Moderate water intake rate; steep slopes.	Highly erodible	Steep slopes; sandy; difficult to vegetate.
Moderate permeability; seasonal high water table.	Moderate water intake rate; medium available water capacity; seasonal high water table.	Seasonal high water table; nearly level.	Seasonal high water table.
Moderate permeability; high water table; subject to flooding.	Moderate water intake rate; high available water capacity; high water table.	High water table; subject to flooding.	High water table; subject to flooding.
Drainage adequate	Moderate water intake rate; high available water capacity; gently sloping and moderately steep.	Stony substratum; gently sloping and moderately steep.	Stony substratum; gently sloping and moderately steep.
Drainage adequate	Moderate water intake rate; medium available water capacity; gently sloping to moderately steep.	Dolomite bedrock at a depth of less than 40 inches; gently sloping to moderately steep.	Dolomite bedrock at a depth of less than 40 inches.
Drainage adequate	Moderate water intake rate; high available water capacity; gently sloping and sloping.	Stony substratum; gently sloping and sloping.	Stony substratum.

TABLE 9.—*Engineering*

[Tests were performed by the State Highway Commission of Wisconsin in cooperation with the U.S. Department of Commerce, Bureau of

Soil name, parent material, sample number, and location	Depth from surface	Moisture density [1]		Mechanical analysis [2]				
				Percentage passing sieve—				
		Maximum dry density	Optimum moisture	2-in.	1½-in.	1-in.	¾-in.	⅜-in.
	In.	*Lb. per. cu. ft.*	*Pct.*					
Dakota loam (glacial outwash): S-61-WI 23-1 NE¼SE¼SE¼ sec. 14, T. 2 N., R. 9 E. Modal.	17-22	130. 8	8. 8	--------	--------	--------	--------	--------
	29-40	110. 9	12. 5	--------	--------	100	99	97
S-61-WI 23-2 NW¼NE¼ sec. 36, T. 2 N., R. 9 E.	14-20	--------	--------	--------	--------	--------	--------	--------
	26-40	--------	--------	--------	--------	--------	--------	--------
Dickinson sandy loam (sandy loam over sandy outwash): S-61-WI 36-1 SE¼SE¼ sec. 14, T. 2 N., R. 9 E. Modal.	17-22	131. 0	9. 0	--------	--------	--------	--------	--------
	29-40	111. 0	13. 0	--------	--------	100	99	97
S-61-WI 36-3 SW¼SE¼ sec. 16, T. 3 N., R. 8 E. Finer textured than modal.	11-19	--------	--------	--------	--------	--------	--------	--------
	28-40	--------	--------	--------	--------	--------	--------	--------
Fayette silt loam: S-63-WI 23-1 SE¼SE¼ sec. 30, T. 1 N., R. 6 E.	27-36	105. 2	19. 0	--------	--------	--------	--------	--------
	50-65	112. 2	15. 6	--------	--------	--------	--------	--------
S-63-WI 23-2 NE¼SE¼ sec. 34, T. 3 N., R. 6 E. More clayey than modal.	26-33	--------	--------	--------	--------	--------	--------	--------
	50-60	--------	--------	--------	--------	--------	--------	--------
S-63-WI 23-3 NW¼NW¼ sec. 35, T. 1 N., R. 6 E. More clayey than modal.	26-42	--------	--------	--------	--------	--------	--------	--------
	42-52	--------	--------	--------	--------	--------	--------	--------
Fox loam (loam over sand and gravel): S-61-WI 23-35 NW¼SE¼ sec. 21, T. 4 N., R. 9 E.	18-32	--------	--------	--------	--------	--------	--------	--------
	41-120	--------	--------	99	97	93	91	79
Miami silt loam (thin silt over loam till): S-63-WI 23-13 NW¼NW¼ sec. 1, T. 1 N., R. 8 E. Modal.	15-24	113. 2	16. 1	100	99	92	91	88
	26-36	124. 5	10. 5	--------	100	99	97	94
S-63-WI 23-14 SE¼NE¼ sec. 19, T. 1 N., R. 9 E. Finer textured than modal.	11-25	--------	--------	--------	100	99	99	96
	25-32	--------	--------	--------	--------	100	99	96
S-63-WI 23-15 NW¼NE¼ sec. 17, T. 1 N., R. 9 E. Finer textured than modal.	20-30	--------	--------	--------	--------	--------	--------	--------
	38-60	--------	--------	100	96	94	92	86
Morley silt loam (thin silt over silty clay loam till): S-63-WI 23-4 NE¼NE¼ sec. 25, T. 1 N., R. 6 E.	9-18	97. 5	23. 8	--------	--------	--------	--------	--------
	28-50	108. 0	17. 1	--------	--------	--------	--------	--------
S-63-WI 23-5 SE¼SW¼ sec. 14, T. 1 N., R. 6 E. Coarser textured than modal.	17-26	--------	--------	--------	--------	--------	--------	--------
	34-50	--------	--------	--------	--------	100	99	96

See footnotes at end of table.

test data

Public Roads (BPR), in accordance with standard test procedures of the American Association of State Highway Officials (AASHO) (*1*)]

Mechanical analysis [2]—Continued								Liquid limit	Plasticity index	Classification	
Percentage passing sieve—Continued				Percentage smaller than—						AASHO	Unified [3]
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.	*Pct.*			
----------	100	84	30	30	27	16	12	18	6	A-2-4(0)	SM-SC
96	95	85	41	4	4	4	2	[4] NP	NP	A-3(0)	SP
----------	100	87	20	20	18	11	7	NP	NP	A-2-4(0)	SM
----------	100	81	3	3	3	3	2	NP	NP	A-3(0)	SP
----------	100	84	30	30	27	16	12	18	6	A-2-4	SM
96	95	80	4	4	4	4	2	--------	NP	A-3(0)	SP
----------	100	93	36	36	28	16	12	17	4	A-4(0)	SM
----------	100	92	4	4	4	4	3	--------	NP	A-3(0)	SP
----------	----------	----------	99	98	65	31	27	45.0	22.0	A-7-6(14)	CL
----------	----------	----------	99	98	69	23	15	28.2	8.1	A-4(8)	CL or CH
----------	----------	100	98	97	73	40	34	50.0	26.6	A-7-6(17)	CL
----------	----------	----------	99	99	67	37	30	45.6	23.7	A-7-6(14)	CL
----------	----------	100	99	98	70	39	31	49.0	25.6	A-7-6(16)	CL
----------	----------	100	98	97	68	38	31	48.4	26.1	A-7-6(16)	CL
100	98	91	41	40	35	25	21	32.0	19.0	A-6(3)	SC
63	44	25	5	4	2	1	1	--------	NP	A-1-a(0)	SP—SM
86	83	75	46	44	36	29	25	41.2	22.6	A-7-6(6)	SC
91	87	81	57	54	38	20	14	23.4	8.4	A-4(4)	CL
95	92	86	56	54	42	29	24	34.8	18.7	A-6(8)	CL
92	88	80	53	49	33	16	10	17.4	4.1	A-4(4)	ML-CL
----------	100	95	69	67	56	41	36	45.0	26.4	A-7-6(14)	CL
81	77	68	36	33	22	10	6	15.2	1.6	A-4(0)	SM
100	98	96	87	87	81	65	53	65.6	42.0	A-7-6(20)	CH
----------	100	97	87	85	77	54	39	43.0	24.6	A-7-6(15)	CL
----------	100	98	86	86	80	60	49	55.8	32.6	A-7-6(19)	CH
95	93	91	79	78	67	47	35	43.4	25.1	A-7-6(15)	CL

TABLE 9.—*Engineering*

Soil name, parent material, sample number, and location	Depth from surface	Moisture density [1]		Mechanical analysis [2]				
				Percentage passing sieve—				
		Maximum dry density	Optimum moisture	2-in.	1½-in.	1-in.	¾-in.	⅜-in.
	In.	*Lb. per. cu. ft.*	*Pct.*					
NewGlarus silt loam (silt over limestone):								
S-63-WI 23-10								
SE¼SW¼ sec. 2, T. 2 N., R. 6 E.	12–23	102. 0	20. 7					
Modal.	23–31	90. 0	29. 7					
S-63-WI 23-11								
NW¼SW¼ sec. 31, T. 1 N., R. 6 E.	8–20							
Coarser textured than modal.	20–38				100	96	92	86
S-63-WI 23-12								
NW¼NE¼ sec. 22, T. 4 N., R. 8 E.	19–34							
Coarser textured than modal.	34–38							
Ockley silt loam (silt over deeply weathered outwash):								
S-63-WI 23-1	11–16							
NW¼SE¼ sec. 3, T. 4 N., R. 8 E.	26–33				100	99	98	89
Ossian silt loam (deep silt):								
S-63-WI 23-16								
NW¼SE¼ sec. 25, T. 1 N., R. 9 E.	9–16							
Thinner solum than modal.	25–50							
S-63-WI 23-17								
NE¼NE¼ sec. 21, T. 2 N., R. 8 E.	19–30	104. 7	19. 1					
Modal.	41–60	107. 7	17. 5					
S-63-WI 23-18								
SW¼SW¼ sec. 1, T. 1 N., R. 8 E.	45–60							
Thicker solum than modal.	60–90							
Pecatonica silt loam (silt over deeply weathered till):								
S-60-WI 23-1								
NW¼NW¼ sec. 36, T. 1 N., R. 7 E.	27–33	117. 0	13. 0					
Modal.	33–54	117. 0	15. 0					
S-60-WI 23-2								
NE¼NW¼ sec. 30, T. 1 N., R. 9 E.	24–34							
More silty than modal.	34–44							
S-60-WI 23-3								
NW¼NE¼ sec. 30, T. 1 N., R. 9 E.	24–37							
Thicker solum than modal.	37–80							
Westville loam (deeply weathered loam till):								
S-63-WI 23-7								
NE¼NE¼ sec. 4, T. 4 N., R. 9 E. Modal.	30–44				100	99	99	98
	56–60				100	97	95	90
S-63-WI 23-8								
NW¼SW¼ sec. 7, T. 1 N., R. 7 E. Coarser textured than modal.	22–58				100	96	92	85
	58–70			100	98	97	96	90
S-63-WI 23-9								
SE¼NE¼ sec. 30, T. 1 N., R. 9 E. Finer textured than modal.	24–40	110. 6	16. 8					
	52–60	132. 5	8. 5		100	92	90	85

See footnotes at end of table.

test data—Continued

Mechanical analysis [2]—Continued								Liquid limit	Plasticity index	Classification	
Percentage passing sieve—Continued				Percentage smaller than—						AASHO	Unified [3]
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.				
								Pct.			
----------	----------	----------	99	99	78	45	39	52.2	28.8	A-7-6(18)	CH
----------	100	99	96	95	85	68	61	74.8	44.9	A-7-6(20)	CH
----------	100	99	96	94	76	44	35	50.4	24.0	A-7-6(16)	CH
84	81	78	71	70	64	55	52	63.0	32.5	A-7-5(19)	CH
----------	100	99	86	84	61	37	30	43.0	21.9	A-7-6(14)	CL
----------	100	99	73	71	60	44	35	45.5	25.5	A-7-6(15)	CL
----------	100	95	56	55	43	27	24	25.9	12.1	A-6(5)	CL
81	75	66	26	25	22	16	14	24.8	10.6	A-2-6(0)	SC
----------	100	99	98	97	70	30	25	44.7	21.3	A-7-6(14)	CL
----------	100	99	95	94	63	30	23	38.9	16.0	A-6(10)	CL
----------	----------	----------	100	99	73	39	32	49.9	28.1	A-7-6(17)	CL
----------	----------	----------	99	98	68	32	25	41.2	19.4	A-7-6(12)	CL
----------	----------	----------	100	99	70	39	34	51.7	28.9	A-7-6(18)	CH
----------	----------	100	89	86	50	27	22	35.1	14.1	A-6(10)	CL
----------	100	94	62	58	48	36	32	36.0	20.0	A-6(9)	CL
----------	100	95	66	64	52	36	32	37.0	20.0	A-6(10)	CL
----------	100	98	92	91	81	41	31	38.0	17.0	A-6(11)	CL
----------	100	93	61	58	49	34	29	37.0	21.0	A-6(9)	CL
----------	100	94	69	68	56	39	33	37.0	19.0	A-6(11)	CL
100	98	90	57	55	44	29	24	30.0	14.0	A-6(6)	CL
97	96	88	47	45	36	23	19	28.8	15.0	A-6(4)	SC
86	82	74	36	34	22	11	7	----------	NP	A-4(0)	SM
79	73	60	34	32	27	19	16	43.4	19.4	A-2-7(2)	SC
84	77	58	19	17	13	9	7	----------	NP	A-2-4(0)	SM
----------	100	94	64	62	52	37	31	35.4	17.2	A-6(9)	CL
80	77	68	38	36	22	9	7	----------	NP	A-4(1)	SM

TABLE 9.—*Engineering*

Soil name, parent material, sample number, and location	Depth from surface	Moisture density [1]		Mechanical analysis [2]				
		Maximum dry density	Optimum moisture	Percentage passing sieve—				
				2-in.	1½-in.	1-in.	¾-in.	⅜-in.
	In.	*Lb. per. cu. ft.*	*Pct.*					
Whalan silt loam (thin loess over glacial drift): S-60-WI 23-5 SW¼NW¼ sec. 32, T. 1 N., R. 8 E. Modal.	17–35	123.7	12.3	-------	-------	-------	-------	-------
S-60-WI 23-6 SW¼NE¼ sec. 16, T. 1 N., R. 6 E.	15–29	----------	----------	-------	-------	-------	-------	-------

[1] Based on AASHO Designation: T 99-57, Method A (*1*).
[2] Mechanical analysis according to AASHO Designation: T88-57 (*1*). Results by this procedure may differ somewhat from results obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analysis data used in this table are not suitable for naming textural classes for soils.

Soils of the calcareous outwash plains formed in calcareous, loamy outwash deposits. The depth and intensity of weathering was probably determined by the texture, thickness, and calcium carbonate ($CaCO_3$) equivalent of the outwash material. Moderately thick loamy deposits that have a high calcium carbonate equivalent are developed to a depth of 24 to 40 inches and have a sandy clay loam or clay loam subsoil. Representative soils are those of the Fox and Matherton series. Soils in areas of thick loamy deposits in which the calcium carbonate equivalent was medium formed to a depth of 40 to 60 inches and also have a clay loam or sandy clay loam subsoil. Representative soils are those of the Ockley and Thackery series. Soils that formed in thick sandy deposits in which the calcium carbonate equivalent was low have a heavy loam and sandy loam subsoil. They are 36 to 60 inches deep to calcareous outwash material. The Oshtemo soils are representative.

The glaciated part of Green County has been covered by at least two different ice sheets, and approximately 23 percent of the county is covered by glacial till. The till deposited by the first glaciation was laid down long before the loess mantle began to accumulate. This allowed the till time to form a profile free of loess influence to a depth of 45 to 60 inches or more. After subsequent deposits of loess, soil formation became more concentrated in the loess part of the profile and less concentrated in the till part. These soils are now considered to be a Paleosol beneath a soil that formed in loess of varying thicknesses. Extensive areas of these soils are south of Monroe from the Pecatonica River to the Rock County line. Representative soils are those of the Durand, Flagg, Ogle, and Pecatonica series.

The most recent till deposits have resulted in the formation of soils that are a product of both the till and the loess mantle. Soils that formed in sandy loam till have a sandy clay loam subsoil; those that formed in loam and silt loam till have a clay loam subsoil; and those that formed in silty clay loam till have a silty clay subsoil. Soils representative of each textural group are those of the Griswold, Miami, and Morley series, respectively. Soils that formed in less than 15 inches of loess have their entire subsoil formed from till. Soils that formed in 20 to 40 inches of loess have half their subsoil formed from loess and half from the underlying till. They are relatively young, and they have developed only to a depth of 24 to 45 inches. Representative soils are those of the Cadiz, Dodge, Juda, Lamartine, and Saybrook series. Soils that formed in a loess mantle more than 50 inches thick have their entire solum formed in loess and little or none in till. Representative soils are in the Downs, Fayette, and Muscatine series.

In places where bedrock is near the surface, the thickness of the till ranges from 12 to 20 inches. No calcareous till is present in the solum in soils in these areas. Representative soils are those of the Arland, Rockton, and Whalan series.

The lacustrine soils have developed to a depth of 24 to 40 inches in calcareous, stratified silts, clays, and fine sands. These soils are difficult to manage because the parent material is fine in texture. They have a clayey subsoil and are moderately slowly permeable to air and water.

The dominant areas of soils that formed in alluvium are along all major streams in the county. They consist of soils of the Arenzville, Huntsville, Orion, and Otter series. The Chaseburg soils, which also formed in alluvium, are more nearly confined to colluvial-alluvial deposits of the upland drainageways.

Within the low-bottom areas of soils that formed in alluvium are deposits of organic soils. The parent material of these soils consists primarily of vegetable matter

test data—Continued

Mechanical analysis [2]—Continued								Liquid limit	Plasticity index	Classification	
Percentage passing sieve—Continued				Percentage smaller than—							
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.			AASHO	Unified [3]
								Pct.			
----------	100	94	58	56	46	28	23	25	11	A-6(5)	CL
----------	100	98	68	65	53	31	26	34	18	A-6(10)	CL

[3] SCS and BPR have agreed that all soils having plasticity indexes within two points of A-line are to be given a borderline classification. Examples of borderline classifications obtained by this use are SM-SC and ML-CL.
[4] Nonplastic.

(sedges and grasses) in various stages of decomposition. Representative soils are those of the Adrian, Houghton, and Palms series.

Climate.—The climate of Green County is of the cool, moist-subhumid, continental type characteristic of north-central United States. Average temperature and precipitation by months are shown in table 11. The climatic factor in soil formation expresses itself through the moisture and heat energy it contributes to an environment. This influences soils both directly and indirectly. The most important direct effect of climate is the weathering of rocks and the alteration of parent materials. Its indirect action, however, is often of equal or greater significance. For instance, the clay content of soils tends to increase as precipitation increases or as temperature rises. Also, the indirect action of climate through organisms, for which it supplies energy and a suitable enviroment, is of special significance in the accumulation of organic matter and increased fertility. In Green County this latter indirect influence is evident in Dodgeville and Tama soils and other Mollisols.

Soils on extensive land areas, such as continents, are affected by general or macroclimatic conditions. In a small, localized area of soil, such as that within the scope of this survey, however, we are more concerned with local or microclimatic conditions. Climate within the county is modified locally by variations in relief and by aspect of slopes.

Lithic Hapludolls, Mollisols, and Hapludalfs, which often formed in close association, are evidence of the influence of microclimatic conditions. For example, the formation of Lithic Hapludolls, such as the soils of the Sogn series, is attributed in large part to the fact that more rain is lost through runoff on steep slopes than on gentle ones. Less water penetrates the steeper land surface to furnish moisture for plant growth, microbiological activity, and rock disintegration. As a result, biological, physical, and chemical agents of weathering are suppressed and soil formation is slowed.

On slopes that face the sun and that are exposed to the wind during the warmer part of the day—that is, on slopes with southerly or westerly aspects—the surface becomes warmer and drier than it does on slopes that have northerly exposures. Thus, on the north-facing slopes, microclimatic influences give rise to more humid conditions, somewhat cooler temperatures, and denser growth of trees. On the warmer, less humid south-facing slopes, they contribute to dominantly grassy or sparsely wooded vegetation.

Plants and animals.—The biological factor in soil formation is concerned chiefly with vegetative cover and organic-matter accumulation. Bacteria, fungi, earthworms, and man, however, are also regarded as important components of the biological factor. Two of the chief functions of plant and animal life are those of furnishing organic matter for the soil and translocating plant nutrients from lower to upper layers.

Before the county was settled, the native vegetation was most important in the complex of living organisms that affect soil formation. The first settlers found dominantly heavy stands of sugar maple, basswood, and oak in the western third of the county. In the north-central uplands of the county, they encountered grasslands, and in the south, oak forests and grasslands coexisting in vegetational complexes.

An outstanding example of the influence of this native vegetation on soil profile characteristics may be seen in the contrast between dark-colored Mollisols, or grassland soils, and light-colored Alfisols, or forest soils. Even on parent material of similar physical and mineral composition, the presence of trees in one place and grass in another gives rise to Hapludalfs, such as Fayette soils, and Argiudolls, such as Tama soils, respectively. The difference in the amount of organic matter between the dark-

colored grassland soils and the light-colored forest soils is ascribed partly to the fact that forest soils are generally more acid than are grassland soils. The relatively nonacid humus of grasslands is more stable than the more soluble acid humus of forests.

In places where the vegetation is a mixture of trees and grasses, the characteristics listed in the previous paragraph are intermediate between prairie and forest soils. These intergrade characteristics are exemplified in the Downs series.

In the continuously cultivated soils of Green County, man, as a component of the biological factor, has brought about sufficient change in the virgin soil to require separate interpretation and classification. These changes include (1) alteration in pH and fertility of acid soils after liming, (2) perpetuation of grassland vegetation in normally wooded areas through repeated grass fires, (3) humus losses because of improper cropping and tillage practices, and (4) accelerated erosion following persistent removal of plant cover of terraces and upland fields. The Arenzville soils, the result in many instances of this last practice, formed through erosion, transportation, and deposition of upland or terrace silts over wet, dark-colored, geologic alluvium of the stream flood plains.

Man often causes changes in the soil by making vegetation an independent variable. For instance, he may plant different crops in similar soils within the same general area. Thus, in neighboring fields, one having permanent pasture and the other row-cropped land, any difference in fertility, organic-matter content, or other soil characteristic may be attributed in large part to man's influence in directing or controlling selected plant growth.

Man undoubtedly will make other contributions to the future direction and rate of formation of soils in the county. The continued clearing of woodlands, the cultivation of the soil, the introduction of new plant species, the building of water-control structures, and the artificial improvement of natural drainage will be reflected in the direction and rate of soil genesis in the future. Some of these changes, however, may not be evident for centuries.

Relief.—The differences in elevation and inequalities of various land surfaces in Green County are reflections of geologic and hydrographic influences. Hills, valleys, benches, and outwash plains are the result of the work of rains, rivers, winds, glacial melt waters, and glacial deposits, all acting throughout long periods of time. In places where bedrock is at a relatively shallow depth, the dip of the surface rock formations controls the direction and angle of water movement. The resistance or weakness of rock texture has determined where lowlands would be sculptured by stream erosion. South of Monroe the topography is influenced by the thickness of the till and by the direction that the glaciers moved. As the glaciers moved in, they filled the valleys with debris (till) and scraped off the tops of ridges. In this way, they smoothed the landscape, creating long, gentle slopes with broad ridgetops. Along the Sugar River valley, glacial melt waters have eroded away the valley walls, thus widening the valley. As the melt waters slowed, they dropped the sediment they were carrying and created broad, level or nearly level outwash plains.

Relief also influences soil formation by controlling drainage, runoff, and other direct or indirect effects of water, including erosion. Relative elevations, or inequalities of the land surface, of a given type of parent material can often be correlated closely with (1) drainage, (2) thickness and organic-matter content of the A horizon, (3) depth of the solum, and (4) horizon differentiation within the soils of that area.

Drainage characteristics are usually reflected in the color, degree, and kind of mottling or gleying in the soil profile. For example, the well-drained, gently sloping to sloping Downs, Fayette, Miami, Ogle, and Pecatonica soils on uplands and the well-drained Dakota, Fox, Gotham, and Meridian soils on stream benches have similar mottling characteristics. All are free of mottling in the A and B horizons, but all may be mottled deep in the C horizon or below a depth of 5 feet. The well drained to moderately well drained, gently sloping to sloping Morley and Saylesville soils are on stream benches and uplands and are mottled in the lower B and C horizons. The somewhat poorly drained, nearly level Muscatine and Stronghurst soils on benches commonly have mottling below a depth of 8 to 16 inches in the upper B and C horizons. The poorly drained Ettrick, Marshan, and Ossian soils of low stream benches and bottom lands are in flat and concave areas and are mottled in the A horizon and gleyed in the B horizon.

Relief is often related directly or indirectly to the thickness of organic-matter content of the surface layer. The usual toposequence in Green County, as in other places, consists of light-colored soils where slopes are steeper or convex and successively darker and thicker surface layers where slopes are gentler or concave. As slopes become more level, runoff is slowed and total water intake increases. The improvement in the soil-water relationship creates a soil-moisture environment favorable for increased plant growth and, consequently, for higher organic-matter deposition and humus accumulation.

Under a slightly increased moisture percentage, a soil can provide a continued favorable environment for most micro-organisms and still produce more vegetable matter than can be decomposed readily by these micro-organisms. The result would be a still further increase of organic matter. As gentle slopes become concave, waterlogging may occur and hydromorphic conditions may be established. Under such conditions, mesophytic plants are replaced by hydrophutes, most decomposing micro-organisms disappear, and the soil begins to take on the characteristic black A horizon of the Aquolls.

Relief, in addition, may also be correlated with the depth of the solum and with horizon differentiation. The toposequence in the driftless part of the county generally consists of immature, skeletal, normally steep-sloping soils and progressively deeper soils that have a more clayey subsoil and are more gently sloping. This relationship is well illustrated in the Sogn and Dodgeville soils. Both formed in the same parent material, but the Sogn soils lack the textural and structural B horizon of the deeper, more gently sloping Dodgeville soils.

Time.—Time is required by the active agents of soil formation to form soils from parent material. Some soils form rapidly; others form slowly. The time required for the formation of a given type of soil depends on other factors involved. Time, therefore, is never an independent variable.

Probably the loessial material that makes up the sur-

face of most of Green County was deposited during and after the advance of the Wisconsin Age glaciers through regions peripheral to the driftless area. The latest advance of the glacial ice sheet was about 11,000 years ago (*3*). This period of till and loess deposition probably represents zero soil-formation time for Downs, Fayette, Tama, and other loessial soils whose entire solum formed in silt. Some soils having a strongly developed solum that formed partly or entirely in bedrock residuum may be much older. The Durand, Flagg, Ogle, Pecatonica, and associated soils are also thought to be older. Apparently they already had a well-developed solum that formed in till deposited by the earlier ice sheet.

Some soils, because of their recent deposition, show little if any profile development. Among such immature soils in Green County are those of the Arenzville, Boone, Chaseburg, Huntsville, Orion, and Otter series. These soils have little or no profile, although layering is evident in places.

The ages of the original soils of the high stream benches in the county are difficult to determine. The reason for this is that ancient winds blanketed material of various ages on the terraces and uplands with loess cappings of similar age variation. Generally water-deposited material of the higher terraces is referred to as old alluvium, and that of the lower ones as youthful alluvium. Among the silty soils that formed over older terrace alluvium are the Fayette, Muscatine, Stronghurst, and Tama soils on benches. Among the soils that formed in recent alluvium of lower terraces are those of the Gotham and Meridian series.

Classification of Soils

Soils are classified so that we can more easily remember their significant characteristics. Classification enables us to assemble knowledge about the soils, to see their relationship to one another and to the whole environment, and to develop principles that help us understand their behavior and their response to manipulation. First through classification, and then through use of soil maps, we can apply our knowledge of soils to specific fields and other tracts of land.

Thus, in classification, soils are placed in narrow categories that are used in detailed soil surveys so that knowledge about the soils can be organized and used in managing farms, fields, and woodland; in developing rural areas; in engineering work; and in many other ways. Soils are placed in broad classes to facilitate study and comparison in large areas, such as countries and continents.

The system currently used was adopted for general use by the National Cooperative Soil Survey in 1965. The current system is under continual study. Therefore, readers interested in developments of the current system should search the latest literature available (*2*, *5*). In table 10 the soil series of Green County are placed in some categories of the current system.

The current system of classification has six categories. Beginning with the broadest, these categories are order, suborder, great group, subgroup, family, and series. In this system the criteria used as a basis for classification are soil properties that are observable and measurable. The properties are so chosen that the soils of similar genesis, or mode of origin, are grouped together. Most of the classes of the current system are briefly defined in the following paragraphs.

ORDER.—Ten soil orders are recognized in the current system. They are Entisols, Vertisols, Inceptisols, Aridisols, Mollisols, Spodosols, Alfisols, Ultisols, Oxisols, and Histosols. The properties used to differentiate these soil orders are those that tend to give broad climatic groupings of soils. The two exceptions to this are Entisols and Histosols, which occur in many different kinds of climate.

Table 10 shows that the five soil orders recognized in Green County are Alfisols, Entisols, Histosols, Inceptisols, and Mollisols.

Alfisols are mineral soils that contain horizons of clay accumulation. Unlike the Mollisols, they lack a thick, dark-colored surface layer that contains colloids dominated by bivalent cations, but the base status of the lower horizons is not extremely low.

Entisols are light-colored soils that do not have natural genetic horizons or that have only very weakly expressed beginnings of such horizons. These soils do not have traits that reflect soil mixing caused by shrinking and swelling.

Histosols include soils having more than 16 inches of accumulated organic matter at the surface. Proposals for the further classification of these soils are being made at this time.

Inceptisols are generally on young surfaces or on older surfaces that weather at an extremely slow rate. Their name is derived from the Latin *inceptum*, which means beginning.

Mollisols formed under grass and have a thick, dark-colored surface layer containing colloids dominated by bivalent cations. The soil material in these soils has not been mixed by shrinking and swelling.

SUBORDER.—Each order has been subdivided into suborders, primarily on the basis of the characteristics that seem to produce classes that have the greatest genetic similarity. The suborders narrow the broad climatic range permitted in the order. The soil properties used to separate suborders are mainly those that reflect either the presence or absence of waterlogging or that reflect soil differences resulting from the climate or vegetation.

GREAT GROUP.—Suborders are separated into great groups on the basis of uniformity in the kinds and sequence of major soil horizons and features. The horizons used to make separations are those in which clay, iron, or humus have accumulated or those that contain a pan that interferes with the growth of roots or the movement of water. The features used are the self-mulching properties of clay, soil temperature, major differences in chemical composition (mainly calcium, magnesium, sodium, and potassium), and the like. The great group is not shown separately in table 10, because it is the last word in the name of the subgroup.

SUBGROUP.—Great groups are subdivided into subgroups, one representing the central (typic) segment of the group, and others, called intergrades, that have properties of the group and also one or more properties of another great group, suborder, or order. Subgroups may also be made in those instances where soil properties intergrade outside of the range of any other great group, suborder, or order. The names of subgroups are derived by placing one or more adjectives before the great group.

TABLE 10.—*Soil series classified according to the current system of classification*

Series	Family	Subgroup	Order
Adrian	Sandy or sandy-skeletal, mixed, euic, mesic	Terric Medisaprists	Histosols.
Arenzville	Coarse-silty, mixed, nonacid, mesic	Typic Udifluvents	Entisols.
Arland, warm variant	Fine-loamy over sand or sandy-skeletal, mixed, mesic	Typic Hapludalfs	Alfisols.
Ashdale	Fine-silty, mixed, mesic	Typic Argiudolls	Mollisols.
Billett	Coarse-loamy, mixed, mesic	Mollic Hapludalfs	Alfisols.
Boone	Sandy, mesic, uncoated	Typic Quartzipsamments	Entisols.
Brookston	Fine-loamy, mixed, noncalcareous, mesic	Typic Argiaquolls	Mollisols.
Cadiz	Fine-silty, mixed, mesic	Typic Hapludalfs	Alfisols.
Chaseburg	Coarse-silty, mixed, nonacid, mesic	Typic Udifluvents	Entisols.
Colwood	Fine-laomy, mixed, noncalcareous, mesic	Typic Haplaquolls	Mollisols.
Dakota	Fine-loamy over sandy or sandy-skeletal, mixed, mesic	Typic Argiudolls	Mollisols.
Dells	Fine-silty over sandy or sandy-skeletal, mixed, mesic	Aquollic Hapludalfs	Alfisols.
Del Rey	Fine, illitic, mesic	Aeric Ochraqualfs	Alfisols.
Dickinson	Coarse-loamy, mixed, mesic	Typic Hapludolls	Molisols.
Dodge	Fine-silty, mixed, mesic	Typic Hapludalfs	Alfisols.
Dodgeville	Fine-silty over clayey, mixed, mesic	Typic Argiudolls	Mollisols.
Downs	Fine-silty, mixed, mesic	Mollic Hapludalfs	Alfisols.
Dunbarton	Clayey, montmorillonitic, mesic	Lithic Hapludalfs	Alfisols.
Durand	Fine-loamy, mixed, mesic	Typic Argiudolls	Mollisols.
Edmund	Clayey, montmorillonitic, mesic	Lithic Argiudolls	Mollisols.
Eleva	Coarse-loamy, mixed, mesic	Typic Hapludalfs	Alfisols.
Elkmound	Loamy, mixed, mesic	Lithic Dystrochrepts	Inceptisols.
Ettrick	Fine-silty, mixed, noncalcareous, mesic	Typic Argiaquolls	Mollisols.
Fayette	Fine-silty, mixed, mesic	Typic Hapludalfs	Alfisols.
Flagg	Fine-silty, mixed, mesic	Typic Hapludalfs	Alfisols.
Fox	Fine-loamy over sandy or sandy-skeletal, mixed, mesic	Typic Hapludalfs	Alfisols.
Gale	Fine-silty over sandy or sandy-skeletal, mixed, mesic	Typic Hapludalfs	Alifisols.
Gotham	Sandy, mixed, mesic	Psammentic Hapludalfs	Alfisols.
Griswold	Fine-loamy, mixed, mesic	Typic Argiudolls	Mollisols.
Hebron	Fine-loamy, mixed, mesic	Typic Hapludalfs	Alfisols.
Hebron, mottled subsoil variant.	Fine-loamy, mixed, mesic	Aquic Hapludalfs	Alfisols.
Hixton	Fine-loamy over sandy or sandy-skeletal, mixed, mesic	Typic Hapludalfs	Alfisols.
Houghton	Euic, mesic	Typic Medisaprists	Histosols.
Huntsville	Fine-silty, mixed, mesic	Cumulic Hapludolls	Mollisols.
Juda	Fine-silty, mixed, mesic	Mollic Hapludalfs	Alfisols.
Lamartine	Fine-silty, mixed, mesic	Aquollic Hapludalfs	Alfisols.
Lawler	Fine-loamy over sandy or sandy-skeletal, mixed, mesic	Aquic Hapludolls	Mollisols.
Lindstrom	Fine-silty, mixed, mesic	Cumulic Hapludolls	Mollisols.
Marshan	Fine-loamy over sandy or sandy-skeletal, mixed, noncalcareous, mesic.	Typic Haplaquolls	Mollisols.
Matherton	Fine-loamy over sandy or sandy-skeletal, mixed, mesic	Udollic Ochraqualfs	Alfisols.
Maumee	Sandy, mixed, noncalcareous, mesic	Typic Haplaquolls	Mollisols.
Meridian	Fine-loamy over sandy or sandy-skeletal, mixed, mesic	Mollic Hapludalfs	Alfisols.
Miami	Fine-loamy, mixed, mesic	Typic Hapludalfs	Alfisols.
Mifflin	Fine-loamy, mixed, mesic	Typic Hapludalfs	Alfisols.
Mifflin, shallow solum variant.	Loamy, mixed, mesic	Lithic Hapludalfs	Alfisols.
Morley	Fine, illitic, mesic	Typic Hapludalfs	Alfisols.
Muscatine	Fine-silty, mixed, mesic	Aquic Argiudolls	Mollisols.
Myrtle	Fine-silty, mixed, mesic	Mollic Hapludalfs	Alfisols.
Navan	Fine-loamy, mixed, noncalcareous, mesic	Typic Argiaquolls	Mollisols.
New Glarus	Fine-silty over clayey, mixed, mesic	Typic Hapludalfs	Alfisols.
Northfield	Loamy, mixed, mesic	Lithic Hapludalfs	Alfisols.
Ockley	Fine-loamy, mixed, mesic	Typic Hapludalfs	Alfisols.
Ogle	Fine-silty, mixed, mesic	Typic Argiudolls	Mollisols.
Orion	Coarse-silty, mixed, nonacid, mesic	Aquic Udifluvents	Entisols.
Orion, wet variant	Coarse-silty, mixed, noncalcareous, mesic	Fluventic Haplaquolls	Mollisols.
Oshtemo	Coarse-loamy, mixed, mesic	Typic Hapludalfs	Alfisols.
Ossian	Fine-silty, mixed, noncalcareous, mesic	Typic Haplaquolls	Mollisols.
Otter	Fine-silty, mixed, noncalcareous, mesic	Cumulic Haplaquolls	Mollisols.
Palms	Loamy, mixed, euic, mesic	Terric Medisaprists	Histosols.
Palsgrove	Fine-silty, mixed, mesic	Typic Hapludalfs	Alfisols.
Pecatonica	Fine-loamy, mixed, mesic	Typic Hapludalfs	Alfisols.
Pillot	Fine-silty over sandy or sandy-skeletal, mixed, mesic	Typic Argiudolls	Mollisols.
Plainfield	Sandy, mixed, mesic	Typic Udipsamments	Entisols.
Rockton	Fine-loamy, mixed, mesic	Typic Argiudolls	Mollisols.
Rodman	Sandy-skeletal, mixed, mesic	Typic Hapludolls	Mollisols.
Saybrook	Fine-silty, mixed, mesic	Typic Argiudolls	Mollisols.
Saylesville	Fine, illitic, mesic	Typic Hapludalfs	Alfisols.
Sebewa	Fine-loamy over sandy or sandy-skeletal, mixed, noncalcareous, mesic.	Typic Argiaquolls	Mollisols.
Shiffer	Fine-loamy over sandy or sandy-skeletal, mixed, mesic	Aquollic Hapludalfs	Alfisols.

TABLE 10.—*Soil series classified according to the current system of classification*—Continued

Series	Family	Subgroup	Order
Sogn	Loamy, mixed, mesic	Lithic Haplustolls	Mollisols.
Stronghurst	Fine-silty, mixed, mesic	Aeric Ochraqualfs	Alfisols.
Sylvester	Fine-silty over sandy or sandy-skeletal, mixed, mesic	Typic Argiudolls	Mollisols.
Tama	Fine-silty, mixed, mesic	Typic Argiudolls	Mollisols.
Tell	Fine-silty over sandy or sandy-skeletal, mixed, mesic	Typic Hapludalfs	Alfisols.
Thackery	Fine-loamy, mixed, mesic	Aquic Hapludalfs	Alfisols.
Wallkill	Fine-loamy, mixed, nonacid, mesic	Thapto-Histic Haplaquepts	Inceptisols.
Westville	Fine-loamy, mixed, mesic	Typic Hapludalfs	Alfisols.
Whalan	Fine-loamy, mixed, mesic	Typic Hapludalfs	Alfisols.
Winnebago	Fine-loamy, mixed, mesic	Typic Argiudolls	Mollisols.

FAMILY.—Families are separated within a subgroup primarily on the basis of properties important to the growth of plants or the behavior of soils when used for engineering. Among the properties considered are texture, mineralogy, reaction, soil temperature, permeability, thickness of horizons, and consistence.

General Nature of the County

Green County was orginally part of Iowa County. The present boundaries were set in 1836, but it was not until 1838 that the area was officially established as Green County. Generally it is believed that the county was named for the famous Revolutionary War general, Nathanael Greene. No one seems to know for sure how it got its name, however, and some believe that "Green" is simply a reference to the overall appearance of vegetation on the landscape.

The county seat is Monroe, which is in the south-central part of the county and has the largest population (8,654) of all cities in the county.

The first settlement reported in Green County was in 1828 near Sugar River at "Sugar River Diggings" in the township of Exeter. This and other early settlements were stimulated by the belief that profitable mineral deposits were in the area. The mining of lead and zinc, the first important industry in the county, was short lived because the supply in mines in Green County and in larger mines in adjoining counties was soon exhausted. Once the mining efforts ceased, attention was given to farming, an enterprise on which residents of Green County thrived.

Farming has changed considerably in Green County over the years. Originally the main crop was wheat; but the soils deteriorated, and competition from other wheat growers made the marketing of wheat unprofitable. In 1845 the first wave of immigrants from Glarus, Switzerland. settled in NewGlarus. They developed one of the most prosperous farming communities in the United States.

Farming overshadows all other employment in Green County, and it receives more emphasis there than in the entire State. Wholesale and retail trade rank second as employers, and manufacturing third.

Good railroads in the county provide rapid and regular hauling to market of farm products. The Illinois Central Railroad runs north and south, and the Chicago, Milwaukee, St. Paul and Pacific runs east and west. Both of these railroads pass through Monroe.

Recreational facilities in the county are available to residents and visitors. They include picnic areas, county parks, and 35 miles of trout streams. Small-game hunting is popular in fall and winter.

Physiography, Drainage, and Geology

Green County lies partly in the "driftless" and partly in the glaciated areas of Wisconsin. The western part of the county is in the driftless area. It consists of a thoroughly dissected plateau with broad, rounded ridgetops and relatively steep valley side slopes. The ridgetops north of NewGlarus are at an elevation of about 1,200 feet.

The eastern and southern parts of the county are glaciated. The area south of Monroe, from the Pecatonica River on the west of the village of Oakley on the east, is covered by glacial till. The topography is typically that of a ground moraine. Ridgetops are broad. The soils are gently sloping and sloping, and the slopes are long. They are steeper in areas that have outcrops of dolomite. More recent glacial till is in the southeastern corner of the county, east of Oakley and south of State Highways 11 and 81. This till is also on high benches in valleys of Searles Creek, Sylvester Creek, and Juda Branch, and in an area about 1,000 acres in size southwest of Brooklyn. The remainder of the glaciated areas are composed of dolomite uplands that have a topography similar to that of the driftless part of the county. The part of the county covered by glacial outwash is associated with valleys of the Sugar River and its tributaries. Also, a small area of outwash is along the Pecatonica River. Geologists believe that the Sugar River is an old glacial spillway. Evidences of outwash material at high elevation along the sides of the valley support this theory. A large outwash plain has been built by melt waters from glaciers farther north and east. Between Belleville (Dane County) and Brodhead, the valley ranges from 2 to 5 miles in width. It has overtopped sandstone in some areas and left outcrops scattered along its western edge. All areas of the outwash plain are on benches. The soils in these areas are level and gently sloping, and the slopes are long. Higher benches generally are well drained, but low benches and bottoms generally are wet.

North of Juda, most of the driftless soils and some of

the glaciated soils are underlain by dolomite. The landform of this area conforms to the configuration of the dolomite. The steep, lower side slopes are underlain by sandstone. These areas are mostly along the valley slopes of the larger creeks. Sandstone upland is along the western edge of the Sugar River and its tributaries. This upland is buried under extremely thick outwash deposits throughout the valleys of the Sugar River and its tributaries. A few small areas of older dolomite are north and east of NewGlarus and south of Albany. Some areas are buried under outwash deposits, just as some of the sandstone is buried under these deposits.

Approximately two-thirds of Green County is drained by the Sugar River and its tributaries. The remaining one-third is drained by the Pecatonica River and its tributaries. The Pecatonica River flows through the southwestern corner of the county. The drainage pattern of both rivers is well defined. Wet areas are only in the broad, flat bottoms where overflow, seepage, and a high water table keep the soil wet most of the year. This condition is more prevalent in the valleys of the Sugar River and its tributaries.

Vegetation

Most of Green County is in the Central Hardwood Forest, but part of the Illinois prairie extends into the county. The county lies within a region that has been described as a "tension zone." Areas within this zone have intergrade soils. Minor changes in climate have been factors in the extension of forests and prairies in the tension zone. Cooler and wetter areas favor extension of the forests; drier and warmer areas favor extension of the prairies.

Early surveyors observed that about one-third of the county was prairie. The remainder of the county, except for small areas of dense underbrush, was covered by thinly scattered timber. Many of the trees were on steep valley slopes. They consisted of black oak, red oak, and bur oak.

The forests probably were extending at the time white men first settled in the county. Areas of oak and hickory woods that have an understory of prairie plants and isolated areas surrounded by forests are evidence of this extension. Indians used to set fires to make openings for cropland and campsites. Because of this, the expansion rate of forests was probably reduced. The prairies in Green County generally were made up of the nearly level to gently sloping soils. The steeper and more rolling soils were covered by trees.

Nearly all of the suitable and accessible soil in the county is now being used for crops or pasture. Only a limited acreage of forest land still exists. Steeper areas of this acreage are best suited to timber or pasture, but some of the other areas could be cleared for cropland.

Climate [5]

The climate of Green County is continental and is characterized by wide variations in temperature throughout the year. All climatic features tend to be extreme. Winters are relatively long, cold, and snowy, while summers are warm and have several short, hot, humid periods. Spring and fall are sometimes short composites of winter and summer. The changes from summer to fall are usually abrupt, while spring weather often lingers to late in May or even to June. Changes in weather can be expected every 2 or 3 days from late in fall to the middle of spring. Green County is in the path of high-pressure centers that move down from Canada and of low-pressure centers that move across the country from southwest to northeast. Heavy winter fogs occasionally form and last for several days when warm Gulf air moving from the south is cooled by contact with the cold surface, especially over snow.

Data in tables 11 and 12 are from Brodhead and are representative of the climate of the county.

During the last 30 years, the number of days in which temperature reached 90 degrees or higher has averaged 28, ranging from as few as 5 in 1958 to as many as 49 in 1934. The average number of days in which temperature reached 0 degrees or lower has been 17, ranging from as few as 5 in 1931 to as many as 38 in 1936. The hottest period on record was July 6–17, 1936, when readings on 12 consecutive days were 100 to 111 degrees F. Heat-growth units above a 40 degree threshold have averaged 4,100; above a 45 degree threshold, 3,400; and above a 50 degree threshold, 2,700.

The average date of the last freeze in spring is May 9, and the average date of the first in fall is October 3. The growing season, defined as the number of days between the last freeze in spring and the first in fall, averages 147 days.

Precipitation is usually adequate for the farming needs of the county. Summer precipitation falls mainly in thunderstorms and tends to be variable. Approximately 55 percent of the average annual total falls in the five-month period, May through September. Since 1897, when records were first kept, only in March 1910 and October 1952 has a measurable amount of precipitation not been recorded. The likelihood of 1 inch or more of rain falling in a 7-day period during summer is greatest in the first half of June, when the chance is 4 years in 10 that such an amount will fall. The likelihood of a dry 7-day period in summer, during which at most a trace of precipitation is recorded, is greatest at the end of August, when the chance of such a period is more than 3 years in 10. Precipitation intensities of about 1.4 inches in 1 hour, 2.2 inches in 6 hours, and 2.9 inches in 24 hours can be expected about once in 2 years. The number of days in which 0.01 inch or more of precipitation falls averages 117, and is between 107 and 127 in 2 of every 3 years.

Average annual snowfall is 35 inches, but totals have ranged from as few as 15 inches in 1938 to as many as 73 inches in 1951. The average date of the first snowfall of 1 inch or more is November 27. In 1 year in 10 this snow will fall by November 5, and in 9 years in 10 it will fall by December 19. Snow cover of 1 inch or more can be expected 10 percent of the time in November, 50 percent in December, 60 percent in January and February, and 30 percent in March.

Thunderstorms occur on an average of 40 days a year, but extremes of 22 and 55 days have been recorded. Hail falls on an average of 3 days a year. In some years no hail falls, but hail has been recorded on as many as 7

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TABLE 11.—*Temperature and precipitation data*

[All data from Brodhead (elevation 780 feet). Period of record 1930–59]

Month	Temperature							Precipitation					
	Average	Average daily maximum	Average daily minimum	Average number of days temperature reaches—				Average total	Greatest daily	Snow and sleet			Average number of days with 0.1 inch or more
				A maximum of—		A minimum of—				Average	Maximum	Greatest daily	
				90° F. or higher	32° F. or lower	32° F. or lower	0° F. or lower						
	° F.	° F.	° F.					Inches	Inches	Inches	Inches	Inches	
January	20. 3	29. 4	11. 2	0	18	30	7	1. 61	1. 65	9. 9	25. 5	19. 0	4
February	23. 5	32. 9	14. 1	0	13	27	5	1. 28	1. 80	6. 4	19. 0	12. 0	4
March	33. 6	43. 0	24. 1	0	5	26	1	2. 08	1. 80	7. 9	25. 0	14. 0	6
April	47. 4	59. 2	35. 6	(1)	(1)	12	0	2. 94	2. 46	4. 8	8. 7	5. 0	6
May	59. 1	71. 6	46. 6	1	0	2	0	3. 33	1. 90	(2)	(2)	(2)	7
June	69. 1	81. 3	56. 9	5	0	0	0	4. 25	4. 05	0	0	0	7
July	74. 0	87. 2	60. 7	11	0	0	0	3. 51	2. 70	0	0	0	6
August	71. 9	84. 8	58. 9	8	0	0	0	4. 09	6. 41	0	0	0	6
September	63. 3	76. 2	50. 4	3	0	1	0	3. 49	4. 45	(2)	(2)	(2)	6
October	51. 9	64. 1	39. 7	(1)	0	8	0	2. 40	2. 88	(2)	. 9	. 9	4
November	36. 5	46. 0	27. 0	0	5	22	(1)	2. 33	1. 92	3. 2	18. 5	6. 5	5
December	24. 6	33. 0	16. 2	0	14	29	4	1. 65	1. 48	6. 5	18. 0	6. 0	5
Year	48. 0	59. 1	36. 8	28	55	157	17	32. 96	6. 41	34. 7	25. 5	14. 0	66

[1] Less than one-half day. [2] Trace.

days in a single year. June averages more days with thunderstorms, 8, than any other month, while May averages the greatest number of hailstorms, about 1 every 2 years. The most likely time for the more severe storms is between 2 p.m. and 7 p.m. during July. Since 1916 four tornadoes have been confirmed in the county.

Wind, sunshine, and humidity observations are not available for Green County; but the following data from Madison will approximate local conditions.

Prevailing winds are westerly from midfall through midspring and are southerly the rest of the year. In March, April, and November, windspeed is greatest, averaging about 12 miles per hour. Windspeed is lowest in July and August, when it averages about 9 miles per hour. Winds in excess of 50 miles per hour can be expected about every other year, usually from the southwest or west. Windspeed averages less than 4 miles per hour about 10 percent of the time, from 4 to 12 miles per hour about 50 percent of the time, from 13 to 31 miles per hour about 40 percent of the time, and more than 31 miles per hour less than 1 percent of the time.

The percentage of possible sunshine averages near 40 during November and December, 60 or more from May through October, and between 50 and 60 during the remaining months. The range in relative humidity during each season is shown in table 13.

TABLE 12.—*Probabilities of last freezing temperatures in spring and first in fall*

[All data from Brodhead]

Probability	Dates for given probability and temperature				
	16° F. or lower	20° F. or lower	24° F. or lower	28° F. or lower	32° F. or lower
Spring:					
2 years in 10, later than	April 2	April 10	April 24	May 6	May 19
4 years in 10, later than	March 25	April 2	April 16	April 29	May 12
6 years in 10, later than	March 19	March 26	April 10	April 23	May 6
8 years in 10, later than	March 11	March 19	April 3	April 16	April 29
Fall:					
2 years in 10, earlier than	November 8	October 29	October 18	October 3	September 23
4 years in 10, earlier than	November 16	November 5	October 25	October 11	September 30
6 years in 10, earlier than	November 22	November 12	November 1	October 18	October 6
8 years in 10, earlier than	November 30	November 19	November 9	October 25	October 13

TABLE 13.—*Range in relative humidity in winter, spring, summer, and fall*

Relative humidity	Percentage of time in—			
	Winter	Spring	Summer	Fall
Less than 50 percent	5	20	15	20
50 to 80 percent	55	50	45	50
Greater than 80 percent	40	30	40	30

Farming

Dairying is the major farm enterprise in Green County. The following pages contain a discussion of the outstanding features of farming in the county. Unless otherwise specified, statistics used are from reports published by the Statistical Reporting Service of Wisconsin (*9*) and by the United States Department of Agriculture. Also, some data are derived from reports of the United States Bureau of the Census.

Land in farms is used for various purposes. The variation in land area, the kind of terrain, the original land cover, and the kinds of soil in the county are some of the factors affecting the use of farmland.

In Green County the acreage in harvested cropland accounted for 54 percent of the 358,966 acres of farmland in 1966, and pastured cropland was 21.4 percent of that total. Other cropland accounted for 1 percent of the farmland. Therefore, total available cropland made up 76.4 percent of the land in farms in Green County in 1966.

Pastured and unpastured woodland together made up about 9 percent of the county's farm acreage, while other pasture accounted for 11.9 percent. The classification "other farmland" includes buildings, roads, and wasteland; and it accounted for the remaining 2.7 percent of the acreage in farms in Green County in 1966.

The soils of Green County are evidence of a need for soil conservation. Bare places on hillsides, gullies, soil material on bottom lands, the reduction of crop yields because of nutrient loss, and the decrease in available moisture capacity are evidence of erosion. Nearly all soil losses in Green County can be attributed to water runoff. Erosion of cultivated land is the result of water delivered to the soil at a rate higher than the infiltration rate of the soil. Some of the factors that combine to determine infiltration rate are related to the nature of the soil, and some are the result of activities related to land use. Farm planning incorporates the latest knowledge obtained from scientific research and practical considerations in the determination of land use. Further information on this subject may be obtained from the local United States Soil Conservation Service representative.

The cropping history of an area may reflect present soil conditions. The 1967 Agricultural Statistics for Wisconsin states that considerable cash-crop grain farming is practiced. This probably indicates an intense program of cultivation, with consequent erosion and depletion of plant nutrients. Gradually, more of this grain is being utilized on the farm as feed for dairy cattle, hogs, and beef cattle.

Tame hay and corn are the two most important crops in Green county. Over 81,000 acres of tame hay were harvested on county farms in 1966. Alfalfa is becoming increasingly popular as a hay crop. In 10 years, alfalfa jumped from 50 to 94 percent of the total acreage in hay.

Corn harvested for grain in Green County totaled 60,900 acres in 1966, and corn for silage totaled 15,100 acres. Corn yields in the county are among the highest in the State.

The third most important crop in the county is oats. In 1966, the total acreage in oats was estimated to be 35,200 acres.

A number of specialty crops are raised on Green County farms. Some strawberries, apples, and other deciduous fruits are reported; but total production of these crops is relatively small compared with production of other crops in the county.

Although about 29 percent of Green County was originally prairie, much of the county had good stands of timber. With the development of farming, however, much of the virgin timber was removed and only steeper slopes and narrow ridges remained wooded.

In 1969 more than half of the 25,710 acres of farm woodland in Green County was used for pasture. In addition, timber was harvested for firewood and fuelwood, sawlogs and veneer logs, fence posts, pulpwood, and other wood products.

Farming in Green County has developed in much the same way as it has in many other counties in the State. Dairying has become the major farm industry, replacing the production of wheat. Raising beef cattle and hogs complements the production of milk products.

Products and services in order of ranking according to their income to farmers as shown in the 1969 Census of Agriculture are as follows: (1) dairy products; (2) hogs, sheep, and goats; (3) dairy cattle and calves; (4) other cattle and calves; (5) tobacco; (6) government farm programs; (7) field seeds, hay, forage, and silage; (8) customwork and other agricultural services; (9) other livestock and livestock products; (10) poultry and poultry products; (11) fruits, nuts, and berries; (12) forest products; (13) nursery and greenhouse products; and (14) vegetables, sweet corn, and melons.

According to the 1967 Agricultural Statistics for Wisconsin, the average yearly per-cow production of milk was 9,900 pounds, sixth in the State. This represented an increase of 2,200 pounds per cow since 1956. The milk is processed for sale as cheese, butter, ice cream, and whole milk. Green County produces more Swiss cheese than any other county in the State.

The 1969 Census of Agriculture reported that 18.7 percent of the county's farms were operated on a rental basis. This is a decline of 12.2 percent since 1964. While tenancy has been declining in the county, the percentage of farmers who rent land in addition to their own has become increasingly important.

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Glossary

AC soil. A soil that has an A and a C horizon but no B horizon. Commonly such soils are immature, as those developing from alluvium or those on steep, rocky slopes.

Acidity. See Reaction.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well-aerated soil is similar to that in the atmosphere; but that in poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as crumbs, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Available water capacity (also termed available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil.

Blinding. The practice of placing permeable material, such as sawdust, woodchips, or coarse aggregate, around newly installed drainage tile to filter out sand, silt, and clay but allow water to enter tile freely.

Blowout. An excavation produced by wind action in loose soil, usually sand.

Calcareous soil. A soil containing enough calcium carbonate (often with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Cobblestone. A rounded or partly rounded fragment of rock, 3 to 10 inches in diameter.

Colluvium. Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard and brittle; little affected by moistening.

Contour stripcropping. Growing crops in strips that follow the contour or are parallel to terraces or diversions. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops of summer fallow.

Diversion, or diversion terrace. A ridge of earth, generally a terrace, that is built to divert runoff from its natural course and, thus, to protect areas downslope from the effects of such runoff.

Drainage class (natural). Refers to the conditions of frequency and duration of periods of saturation or partial saturation that existed during the development of the soil, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven different classes of natural soil drainage are recognized.

Excessively drained soils are commonly very porous and rapidly permeable and have a low available water capacity.

Somewhat excessively drained soils are also very permeable and are free from mottling throughout their profile.

Well-drained soils are nearly free from mottling and are commonly of intermediate texture.

Moderately well drained soils commonly have a slowly permeable layer in or immediately beneath the solum. They have uniform color in the A and upper B horizons and have mottling in the lower B and the C horizons.

Somewhat poorly drained soils are wet for significant periods but not all the time, and some soils commonly have mottling at a depth below 6 to 16 inches.

Poorly drained soils are wet for long periods and are light gray and generally mottled from the surface downward, although mottling may be absent or nearly so in some soils.

Very poorly drained soils are wet nearly all the time. They have a dark-gray or black surface layer and are gray or light gray, with or without mottling, in the deeper parts of the profile.

Effervesce. See Calcareous soil.

End moraine. A ridgelike accumulation of drift built chiefly along the terminal margin of a valley glacier or the margin of an ice sheet. Also known as a terminal moraine.

Flood plain. Nearly level land, consisting of stream sediment, that borders a stream and is subject to flooding unless protected artificially.

Friability. Term for the ease with which soil crumbles. A friable soil is one that crumbles easily.

Genesis, soil. The manner in which a soil originates. Refers especially to the processes initiated by climate and organisms that are responsible for the development of the solum, or true soil, from the unconsolidated parent material, as conditioned by relief and age of landform.

Glacial drift (geology). Rock material transported by glacial ice and then deposited; also includes the assorted and unassorted materials deposited by streams flowing from glaciers.

Glacial outwash (geology). Cross-bedded gravel, sand, and silt deposited by melt water as it flowed from glacial ice.

Glacial till (geology). Unassorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Gravelly soil material. From 15 to 50 percent of material, by volume, consists of rounded or angular rock fragments that are not prominently flattened and are up to 3 inches in diameter.

Ground moraine (geology). Glacial till accumulated beneath the advancing ice and deposited from it during its dissolution, rather than aggregated in a thickened belt at the ice edge; the deposit is relatively thin and characteristically forms an undulating plain with gently sloping swells, sags, and closed depressions.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes. These are the major horizons:

O horizon.—The layer of organic matter on the surface of a mineral soil. This layer consists of decaying plant residues.

A horizon.—The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active and therefore is marked by the accumulation of humus. The horizon may have lost one or more of soluble salts, clay, and sesquioxides (iron and aluminum oxides).

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or some combination of these; (2) by prismatic or blocky structure; (3) by redder or stronger colors than the A horizon; or (4) by some combination of these. Combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The weathered rock material immediately beneath the solum. In most soils this material is presumed to be like that from which the overlying horizons were formed. If the material is known to be different from that in the solum, a Roman numeral precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock usually underlies a C horizon but may be immediately beneath an A or B horizon.

Humus. The well-decomposed, more or less stable part of the organic matter in mineral soils.

Leaching. The removal of soluble materials from soils or other material by percolating water.

Loess. Fine-grained material, dominantly of silt-sized particles, that has been deposited by wind.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineralogical, and biological properties of the various horizons, and their thickness and arrangement in the soil profile.

Mottling, soil. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are as follows: Abundance—*few*, *common*, and *many;* size—*fine*, *medium*, and *coarse;* and contrast—*faint*, *distinct*, and *prominent*. The size measurements are these: *fine*, less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium*, ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse*, more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Muck. An organic soil consisting of fairly well decomposed organic material that is relatively high in mineral content, finely divided, and dark in color.

Munsell notation. A system for designating color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with a hue of 10YR, a value of 6, and a chroma of 4.

Outwash plain. A physical land feature of glaciofluvial origin. Plains are smooth or, where pitted, are usually low in relief. Deposits are mainly sandy or coarse textured.

Parent material. Disintegrated and partly weathered rock from which soil has formed.

Peat. Unconsolidated soil material, largely undecomposed organic matter, that has accumulated where there has been excess moisture.

Ped. An individual natural soil aggregate, such as a crumb, a prism, or a block, in contrast to a clod.

Percolation. The downward movement of water through the soil.

Permeability. The quality that enables the soil to transmit water or air. Terms used to describe permeability are as follows: *very slow*, *slow*, *moderately slow*, *moderate*, *moderately rapid*, *rapid*, and *very rapid*.

Phase, soil. A subdivision of a soil series, or other unit in the soil classification system made because of differences in the soil that affect its management but do not affect its classification in the natural landscape. A soil series, for example, may be divided into phases because of differences in slope, stoniness, thickness, or some other characteristic that affects its management but not its behavior in the natural landscape.

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. An acid, or "sour," soil is one that gives an acid reaction; an alkaline soil is one that is alkaline in reaction. In words, the degrees of acidity or alkalinity are expressed thus:

	pH		*pH*
Extremely acid	Below 4.5	Neutral	6.6 to 7.3
Very strongly acid	4.5 to 5.0	Mildly alkaline	7.4 to 7.8
Strongly acid	5.1 to 5.5	Moderately alkaline	7.9 to 8.4
Medium acid	5.6 to 6.0	Strongly alkaline	8.5 to 9.0
Slightly acid	6.1 to 6.5	Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Sand. Individual rock or mineral fragments in a soil that range in diameter from 0.05 to 2.0 millimeters. Most sand grains consist of quartz, but they may be of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

Sandy soils. A broad term for soils of the sand and loamy sand classes; soil material with more than 70 percent sand and less than 15 percent clay.

Series, soil. A group of soils developed from a particular type of parent material and having genetic horizons that, except for texture of the surface layer, are similar in differentiating characteristics and in arrangement in the profile.

Silt. Individual mineral particles in a soil that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). Soil of the silt textural class is 80 percent or more silt and less than 12 percent clay.

Site index. A numerical means of expressing the quality of a forest site that is based on the height of the dominant stand at an arbitrarily chosen age; for example, the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years.

Soil. A natural, three-dimensional body on the earth's surface that supports plants and that has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soil includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristics of the soil are largely confined to the solum.

Stocking (forestry). The density of a stand of trees, such as well stocked, overstocked, partially stocked.

Stones. Rock fragments greater than 10 inches in diameter if rounded, and greater than 15 inches along the outer axis if flat.

Stratified. Composed of or arranged in strata or layers, such as stratified alluvium. The term is confined to geological material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from parent material are called strata.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. Technically, the part of the soil below the solum.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, about 5 to 8 inches in thickness. The plowed layer.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that it may soak into the soil or flow slowly to a prepared outlet without harm. Terraces in fields are generally built so they can be farmed. Terraces intended mainly for drainage have a deep channel that is maintained in permanent sod.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay*, and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Tilth, soil. The condition of the soil in relation to the growth of plants, especially soil structure. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable, granular structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Topsoil. A presumed fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Upland (geology). Land consisting of material unworked by water in recent geologic time and lying, in general, at a higher elevation than the alluvial plain or stream terrace. Land above the lowlands along rivers.

Water table. The highest part of the soil or underlying rock material that is wholly saturated with water. In some places an upper, or perched, water table may be separated from a lower one by a dry zone.

Weathering. All physical and chemical changes produced in rocks at or near the earth's surface by atmospheric agents. These changes result in more or less complete disintegration and decomposition of rock.

Windbreak. Any shelter that protects from the wind. A vegetative windbreak is a strip of closely spaced trees or shrubs that is planted primarily to deflect wind currents and thereby reduce soil blowing, control snow drifting, conserve moisture, and protect crops, orchards, livestock, and buildings.

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GUIDE TO MAPPING UNITS

For a full description of a mapping unit, read both the description of the mapping unit and the description of the soil series to which the mapping unit belongs. Refer to descriptions of capability units for interpretations concerning common farm crops. Other interpretations are given in tables, as follows:

Acreage and extent, table 1, page 6.
Estimated crop yields, table 2, page 91.
Estimated timber yields, table 3, page 97.
Wildlife, tables 4 and 5, pages 102 through 107.
Engineering, tables 6, 7, 8, and 9, pages 110 through 151.

Map symbol	Mapping unit	Page	Capability unit		Woodland group		Wildlife group
			Symbol	Page	Group	Page	Group
Ac	Adrian muck	5	IVw-7	87	10	96	6
Ad	Alluvial land	8	IIw-13	83	9	96	7
Ae	Alluvial land, wet	8	Vw-14	88	9	96	5b
An	Arenzville silt loam	9	IIw-11	82	1	94	7
ArB2	Arland loam, warm variant, 2 to 6 percent slopes, eroded	9	IIe-2	80	1	94	1
ArC2	Arland loam, warm variant, 6 to 12 percent slopes, eroded	9	IIIe-2	84	1	94	1
ArD2	Arland loam, warm variant, 12 to 20 percent slopes, eroded	10	IVe-2	86	1	94	1
AsB2	Ashdale silt loam, 2 to 6 percent slopes, eroded	10	IIe-1	80	12	96	1
AsC2	Ashdale silt loam, 6 to 12 percent slopes, eroded	10	IIIe-1	84	12	96	1
AsD2	Ashdale silt loam, 12 to 20 percent slopes, eroded	10	IVe-1	86	12	96	1
BlA	Billett sandy loam, 0 to 2 percent slopes	11	IIIs-4	85	3	95	1
BlB2	Billett sandy loam, 2 to 6 percent slopes, eroded	11	IIIs-4	85	3	95	1
BlC2	Billett sandy loam, 6 to 12 percent slopes, eroded	11	IIIe-7	85	3	95	1
BoD	Boone fine sand, 2 to 20 percent slopes	12	VIIs-9	90	4	95	3
Br	Brookston silt loam	13	IIw-1	81	7	96	5b
CdB2	Cadiz silt loam, 2 to 6 percent slopes, eroded	13	IIe-1	80	1	94	2
CdC2	Cadiz silt loam, 6 to 12 percent slopes, eroded	13	IIIe-1	84	1	94	2
ChB	Chaseburg silt loam, 2 to 6 percent slopes	14	IIe-5	80	1	94	7
ChC	Chaseburg silt loam, 6 to 12 percent slopes	14	IIIe-5	84	1	94	7
Cn	Chaseburg and Arenzville silt loams	14	I-2	79	1	94	7
Co	Colwood silt loam	15	IIw-1	81	7	96	5b
DaA	Dakota loam, 0 to 2 percent slopes	15	IIs-1	83	12	96	4
DaB2	Dakota loam, 2 to 6 percent slopes, eroded	16	IIe-2	80	12	96	4
DbA	Dells silt loam, 0 to 3 percent slopes	16	IIw-5	82	7	96	5a
Dc	Del Rey silt loam	17	IIw-2	82	7	96	5a
DdA	Dickinson sandy loam, 1 to 3 percent slopes	17	IIIs-4	85	3	95	4
DeB2	Dodge silt loam, 2 to 6 percent slopes, eroded	18	IIe-1	80	1	94	1
DeC2	Dodge silt loam, 6 to 12 percent slopes, eroded	19	IIIe-1	84	1	94	1
DgB2	Dodgeville silt loam, 2 to 6 percent slopes, eroded	19	IIe-2	80	12	96	4
DgC2	Dodgeville silt loam, 6 to 12 percent slopes, eroded	19	IIIe-2	84	12	96	4
DgC3	Dodgeville silt loam, 6 to 12 percent slopes, severely eroded	19	IVe-2	86	12	96	4
DgD2	Dodgeville silt loam, 12 to 20 percent slopes, eroded	20	IVe-2	86	12	96	4
DoB2	Downs silt loam, 2 to 6 percent slopes, eroded	20	IIe-1	80	1	94	1

Map symbol	Mapping unit	Page	Capability unit Symbol	Capability unit Page	Woodland group Group	Woodland group Page	Wildlife group Group
DoC2	Downs silt loam, 6 to 12 percent slopes, eroded	20	IIIe-1	84	1	94	1
DsA	Downs silt loam, heavy substratum, 0 to 2 percent slopes	21	I-3	80	1	94	2
DsB	Downs silt loam, heavy substratum, 2 to 6 percent slopes	21	IIe-1	80	1	94	2
DsB2	Downs silt loam, heavy substratum, 2 to 6 percent slopes, eroded	21	IIe-1	80	1	94	2
DsC2	Downs silt loam, heavy substratum, 6 to 12 percent slopes, eroded	21	IIIe-1	84	1	94	2
DuB2	Dunbarton silt loam, 2 to 6 percent slopes, eroded	22	IIIe-3	84	5	95	3
DuC2	Dunbarton silt loam, 6 to 12 percent slopes, eroded	22	IVe-3	86	5	95	3
DuD2	Dunbarton silt loam, 12 to 20 percent slopes, eroded	22	VIe-3	88	5	95	3
DuE2	Dunbarton silt loam, 20 to 30 percent slopes, eroded	22	VIIe-3	89	5	95	3
DvD3	Dunbarton silty clay loam, 10 to 20 percent slopes, severely eroded	22	VIIe-3	89	6	95	3
DwB2	Durand silt loam, 2 to 6 percent slopes, eroded	23	IIe-1	80	12	96	4
DwC2	Durand silt loam, 6 to 12 percent slopes, eroded	23	IIIe-1	84	12	96	4
EdB2	Edmund silt loam, 2 to 6 percent slopes, eroded	24	IIIe-3	84	5	95	3
EdC2	Edmund silt loam, 6 to 12 percent slopes, eroded	24	IVe-3	86	5	95	3
EdD2	Edmund silt loam, 12 to 20 percent slopes, eroded	24	VIe-3	88	5	95	3
EeC2	Eleva sandy loam, 6 to 12 percent slopes, eroded	25	IIIe-7	85	3	95	1
EeD2	Eleva sandy loam, 12 to 20 percent slopes, eroded	25	IVe-7	87	3	95	1
ElB2	Elkmound sandy loam, 2 to 6 percent slopes, eroded	25	IIIe-3	84	5	95	3
ElC2	Elkmound sandy loam, 6 to 12 percent slopes, eroded	26	IVe-3	86	5	95	3
ElD2	Elkmound sandy loam, 12 to 20 percent slopes, eroded	26	VIe-3	88	5	95	3
ElE2	Elkmound sandy loam, 20 to 30 percent slopes, eroded	26	VIIe-3	89	5	95	3
ElF	Elkmound sandy loam, 30 to 45 percent slopes	26	VIIe-3	89	5	95	3
Et	Ettrick silt loam	27	IIw-1	81	7	96	5b
FaB2	Fayette silt loam, 2 to 6 percent slopes, eroded	28	IIe-1	80	1	94	1
FaC2	Fayette silt loam, 6 to 12 percent slopes, eroded	28	IIIe-1	84	1	94	1
FaD2	Fayette silt loam, 12 to 20 percent slopes, eroded	28	IVe-1	86	1	94	1
FbA	Fayette silt loam, benches, 0 to 2 percent slopes	28	I-3	80	1	94	1
FbB2	Fayette silt loam, benches, 2 to 6 percent slopes, eroded	28	IIe-1	80	1	94	1
FbC	Fayette silt loam, benches, 6 to 12 percent slopes	28	IIIe-1	84	1	94	1

Map symbol	Mapping unit	Page	Capability unit Symbol	Capability unit Page	Woodland group Group	Woodland group Page	Wildlife group Group
FcB2	Fayette silt loam, loamy substratum, 2 to 6 percent slopes, eroded	28	IIe-1	80	1	94	1
FcC2	Fayette silt loam, loamy substratum, 6 to 12 percent slopes, eroded	29	IIIe-1	84	1	94	1
FcD2	Fayette silt loam, loamy substratum, 12 to 20 percent slopes, eroded	29	IVe-1	86	1	94	1
FeC2	Fayette silt loam, valleys, 6 to 12 percent slopes, eroded	29	IIIe-1	84	1	94	1
FeD2	Fayette silt loam, valleys, 12 to 20 percent slopes, eroded	29	IVe-1	86	1	94	1
FlA	Flagg silt loam, 0 to 2 percent slopes	30	I-3	80	1	94	1
FlB2	Flagg silt loam, 2 to 6 percent slopes, eroded	30	IIe-1	80	1	94	1
FlC2	Flagg silt loam, 6 to 12 percent slopes, eroded	30	IIIe-1	84	1	94	1
FnC2	Fox sandy loam, 6 to 12 percent slopes, eroded	31	IIIe-7	85	3	95	1
FnD2	Fox sandy loam, 12 to 20 percent slopes, eroded	32	IVe-7	87	3	95	1
FoA	Fox loam, 0 to 2 percent slopes	31	IIs-1	83	1	94	1
FoB2	Fox loam, 2 to 6 percent slopes, eroded	31	IIe-2	80	1	94	1
FoC2	Fox loam, 6 to 12 percent slopes, eroded	31	IIIe-2	84	1	94	1
FsA	Fox silt loam, 0 to 2 percent slopes	32	IIs-1	83	1	94	1
FsB2	Fox silt loam, 2 to 6 percent slopes, eroded	32	IIe-2	80	1	94	1
GaB2	Gale silt loam, 2 to 6 percent slopes, eroded	33	IIe-2	80	1	94	1
GaC2	Gale silt loam, 6 to 12 percent slopes, eroded	33	IIIe-2	84	1	94	1
GaD2	Gale silt loam, 12 to 20 percent slopes, eroded	33	IVe-2	86	1	94	1
GaE2	Gale silt loam, 20 to 30 percent slopes, eroded	33	VIe-2	88	1	94	1
GoA	Gotham loamy sand, 0 to 2 percent slopes	34	IVs-3	87	4	95	3
GoB2	Gotham loamy sand, 2 to 6 percent slopes, eroded	34	IVs-3	87	4	95	3
GoC2	Gotham loamy sand, 6 to 12 percent slopes, eroded	34	IVs-3	87	4	95	3
GrB2	Griswold silt loam, 2 to 6 percent slopes, eroded	35	IIe-1	80	12	96	4
GrC2	Griswold silt loam, 6 to 12 percent slopes, eroded	35	IIIe-1	84	12	96	4
HbA	Hebron silt loam, 0 to 2 percent slopes	35	IIs-7	83	1	94	2
HbB2	Hebron silt loam, 2 to 6 percent slopes, eroded	36	IIe-6	81	1	94	2
HeA	Hebron silt loam, mottled subsoil variant, 0 to 3 percent slopes	36	IIw-2	82	7	96	5a
HmB2	Hixton loam, 2 to 6 percent slopes, eroded	37	IIe-2	80	1	94	1
HmC2	Hixton loam, 6 to 12 percent slopes, eroded	37	IIIe-2	84	1	94	1
Hu	Houghton mucky peat	38	IIIw-9	85	10	96	6
HvA	Huntsville silt loam, 0 to 2 percent slopes	38	IIw-11	82	12	96	7
HvB	Huntsville silt loam, 2 to 6 percent slopes	38	IIw-11	82	12	96	7
JuB2	Juda silt loam, 2 to 6 percent slopes, eroded	39	IIe-1	80	1	94	1
JuC2	Juda silt loam, 6 to 12 percent slopes, eroded	39	IIIe-1	84	1	94	1
LaB	Lamartine silt loam, 1 to 6 percent slopes	40	IIw-2	82	7	96	5a
LeA	Lawler loam, 0 to 2 percent slopes	41	IIw-5	82	7	96	5a
LlA	Lawler silt loam, 0 to 3 percent slopes	41	IIw-5	82	7	96	5a

Map symbol	Mapping unit	Page	Capability unit Symbol	Capability unit Page	Woodland group Group	Woodland group Page	Wildlife group Group
LnC2	Lindstrom sandy loam, 6 to 12 percent slopes, eroded	41	IVe-4	86	3	95	4
LnD2	Lindstrom sandy loam, 12 to 20 percent slopes, eroded	42	VIe-4	89	3	95	4
LsC	Lindstrom silt loam, 6 to 12 percent slopes	42	IIIe-1	84	12	96	4
LsD2	Lindstrom silt loam, 12 to 20 percent slopes, eroded	42	IVe-1	86	12	96	4
Mb	Marshan loam	42	IIw-5	82	7	96	5b
Mc	Marshan silt loam	43	IIw-5	82	7	96	5b
Md	Matherton silt loam	43	IIw-5	82	7	96	5a
Me	Maumee sandy loam	44	IVw-5	87	8	96	5b
MlA	Meridian loam, 0 to 2 percent slopes	44	IIs-1	83	1	94	1
MlB2	Meridian loam, 2 to 6 percent slopes, eroded	44	IIe-2	80	1	94	1
MlC2	Meridian loam, 6 to 12 percent slopes, eroded	45	IIIe-2	84	1	94	1
MmB2	Miami silt loam, 2 to 6 percent slopes, eroded	45	IIe-1	80	1	94	1
MmC2	Miami silt loam, 6 to 12 percent slopes, eroded	45	IIIe-1	84	1	94	1
MmD2	Miami silt loam, 12 to 20 percent slopes, eroded	46	IVe-1	86	1	94	1
MnC2	Mifflin loam, 6 to 12 percent slopes, eroded	46	IIIe-2	84	1	94	1
MnD2	Mifflin loam, 12 to 20 percent slopes, eroded	46	IVe-2	86	1	94	1
MoC2	Mifflin loam, shallow solum variant, 6 to 12 percent slopes, eroded	47	IVe-3	86	5	95	3
MoD2	Mifflin loam, shallow solum variant, 12 to 20 percent slopes, eroded	47	VIe-3	88	5	95	3
MrB2	Morley silt loam, 2 to 6 percent slopes, eroded	48	IIe-6	81	2	95	2
MrC2	Morley silt loam, 6 to 12 percent slopes, eroded	48	IIIe-6	85	2	95	2
MrD2	Morley silt loam, 12 to 20 percent slopes, eroded	48	IVe-6	87	2	95	2
MsB2	Muscatine silt loam, 2 to 6 percent slopes, eroded	49	IIw-2	82	7	96	5a
MtA	Muscatine silt loam, benches, 0 to 3 percent slopes	49	IIw-2	82	7	96	5a
MuA	Muscatine silt loam, loamy substratum, 0 to 3 percent slopes	49	IIw-2	82	7	96	5a
MyB2	Myrtle silt loam, 2 to 6 percent slopes, eroded	50	IIe-1	80	1	94	1
MyC2	Myrtle silt loam, 6 to 12 percent slopes, eroded	50	IIIe-1	84	1	94	1
Na	Navan silt loam	51	IIw-1	81	7	96	5b
NgB2	NewGlarus silt loam, 2 to 6 percent slopes, eroded	51	IIe-2	80	1	94	1
NgC2	NewGlarus silt loam, 6 to 12 percent slopes, eroded	52	IIIe-2	84	1	94	1
NgD2	NewGlarus silt loam, 12 to 20 percent slopes, eroded	52	IVe-2	86	1	94	1
NgE2	NewGlarus silt loam, 20 to 30 percent slopes, eroded	52	VIe-2	88	1	94	1
NlC3	NewGlarus soils, 6 to 12 percent slopes, severely eroded	52	IVe-2	86	5	95	1

Map symbol	Mapping unit	Page	Capability unit Symbol	Capability unit Page	Woodland group Group	Woodland group Page	Woodlife group Group
NlD3	NewGlarus soils, 12 to 20 percent slopes, severely eroded	52	VIe-2	88	5	95	1
NoB2	Northfield loam, 2 to 6 percent slopes, eroded	53	IIIe-3	84	5	95	3
NoC2	Northfield loam, 6 to 12 percent slopes, eroded	53	IVe-3	86	5	95	3
NoD2	Northfield loam, 12 to 20 percent slopes, eroded	53	VIe-3	88	5	95	3
NoE2	Northfield loam, 20 to 30 percent slopes, eroded	53	VIIe-3	89	5	95	3
OcA	Ockley sandy loam, 0 to 3 percent slopes	54	IIs-7	83	3	95	1
OeA	Ockley loam, 0 to 2 percent slopes	54	I-3	80	1	94	1
OeB	Ockley loam, 2 to 6 percent slopes	54	IIe-1	80	1	94	1
OkA	Ockley silt loam, 0 to 2 percent slopes	55	I-3	80	1	94	1
OkB2	Ockley silt loam, 2 to 6 percent slopes, eroded	55	IIe-1	80	1	94	1
OkC2	Ockley silt loam, 6 to 12 percent slopes, eroded	55	IIIe-1	84	1	94	1
OlB2	Ogle silt loam, 2 to 6 percent slopes, eroded	56	IIe-1	80	12	96	4
OlC2	Ogle silt loam, 6 to 12 percent slopes, eroded	56	IIIe-1	84	12	96	4
OnA	Orion silt loam, 0 to 3 percent slopes	56	IIw-13	83	9	96	5a
Or	Orion silt loam, wet variant	57	Vw-14	88	9	96	5b
OsA	Oshtemo loamy sand, 0 to 2 percent slopes	57	IIIs-4	85	4	95	3
OsB2	Oshtemo loamy sand, 2 to 6 percent slopes, eroded	58	IIIs-4	85	4	95	3
OsC2	Oshtemo loamy sand, 6 to 12 percent slopes, eroded	58	IIIe-7	85	4	95	3
Ot	Ossian silt loam	58	IIw-1	81	7	96	5b
Ou	Otter silt loam	59	IIw-1	81	9	96	5b
Pa	Palms muck	59	IIw-8	82	10	96	6
PgB2	Palsgrove silt loam, 2 to 6 percent slopes, eroded	60	IIe-1	80	1	94	1
PgC2	Palsgrove silt loam, 6 to 12 percent slopes, eroded	60	IIIe-1	84	1	94	1
PgD2	Palsgrove silt loam, 12 to 20 percent slopes, eroded	60	IVe-1	86	1	94	1
PlD3	Palsgrove silty clay loam, 12 to 20 percent slopes, severely eroded	61	VIe-1	88	1	94	1
PnB2	Pecatonica silt loam, 2 to 6 percent slopes, eroded	61	IIe-1	80	1	94	1
PnC2	Pecatonica silt loam, 6 to 12 percent slopes, eroded	62	IIIe-1	84	1	94	1
PnD2	Pecatonica silt loam, 12 to 20 percent slopes, eroded	62	IVe-1	86	1	94	1
PoA	Pillot silt loam, 0 to 2 percent slopes	62	IIs-1	83	12	96	4
PoB2	Pillot silt loam, 2 to 6 percent slopes, eroded	62	IIe-2	80	12	96	4
PoC2	Pillot silt loam, 6 to 12 percent slopes, eroded	63	IIIe-2	84	12	96	4
PrB2	Plainfield loamy sand, 0 to 6 percent slopes, eroded	63	IVs-3	87	4	95	3
Rh	Riverwash	63	VIIIs-10	90	11	96	8
RkC2	Rockton loam, 6 to 12 percent slopes, eroded	64	IIIe-2	84	12	96	4
RkD2	Rockton loam, 12 to 20 percent slopes, eroded	64	IVe-2	86	12	96	4
RnB2	Rockton silt loam, 2 to 6 percent slopes, eroded	64	IIe-2	80	12	96	4

Map symbol	Mapping unit	Page	Capability unit		Woodland group		Wildlife group
			Symbol	Page	Group	Page	Group
WlD2	Whalan silt loam, 12 to 20 percent slopes, eroded	76	IVe-2	86	1	94	1
WnB2	Winnebago silt loam, 2 to 6 percent slopes, eroded	77	IIe-1	80	12	96	4
WnC2	Winnebago silt loam, 6 to 12 percent slopes, eroded	77	IIIe-1	84	12	96	4

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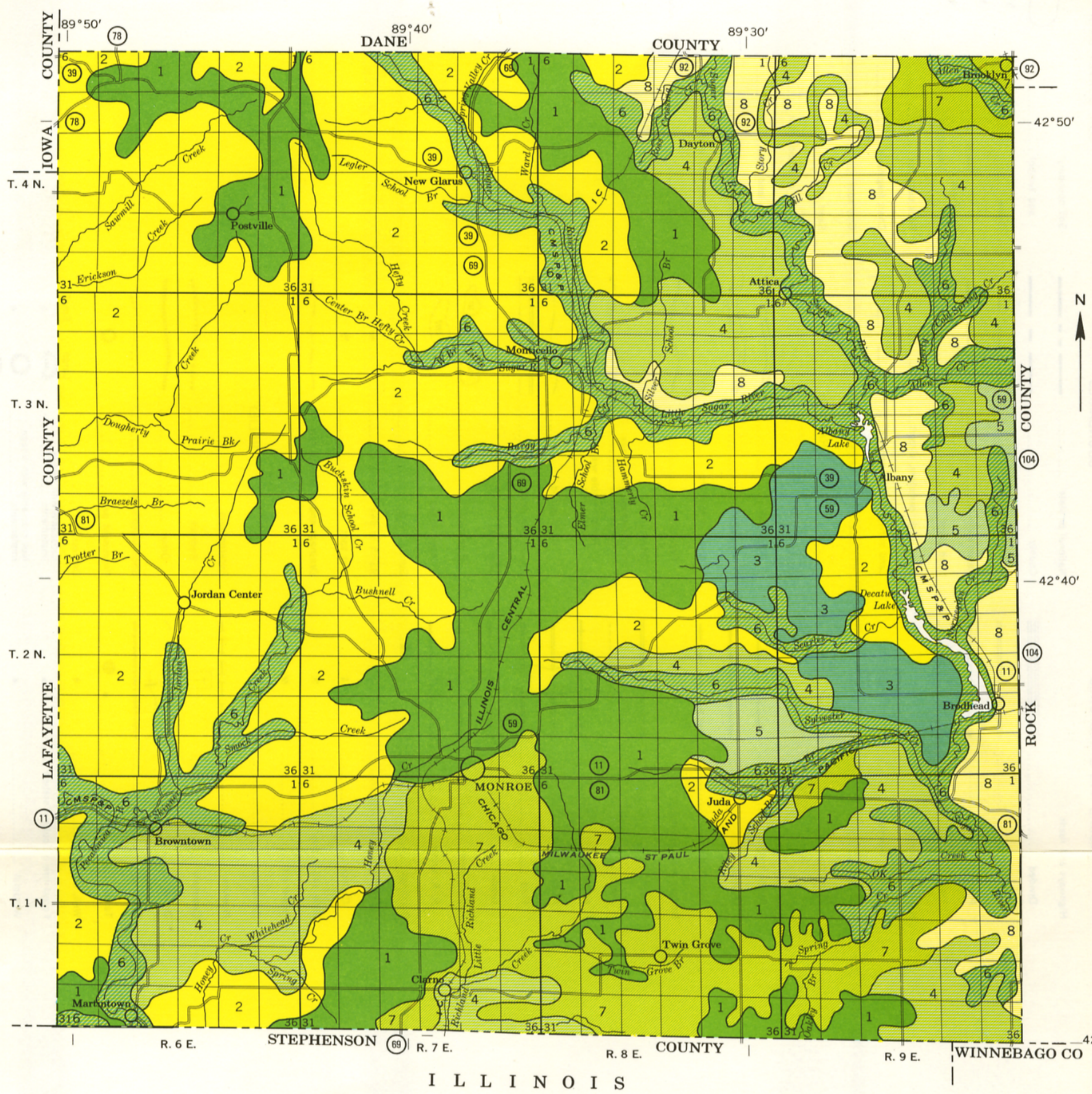

SOIL ASSOCIATIONS

1	Dodgeville-Edmund association: Moderately deep to shallow, nearly level to moderately steep soils that have a clayey subsoil; underlain by dolomite bedrock
2	NewGlarus-Sogn association: Moderately deep to shallow, gently sloping to moderately steep soils, some of which have a clayey subsoil; underlain by dolomite or sandstone
3	Fayette-Tama association: Deep, nearly level to sloping soils that have a silty subsoil and substratum; on benches in valleys
4	Dunbarton-Whalan association: Shallow and moderately deep, gently sloping to moderately steep soils that have a loamy and clayey subsoil over loam till; underlain by dolomite
5	Hebron-Saylesville association: Deep, nearly level to gently sloping soils that have a loamy and clayey subsoil and substratum; in basins that were formerly lakes
6	Orion-Huntsville-Ettrick association: Deep, nearly level and gently sloping soils that are silty throughout; on flood plains and in low areas
7	Durand-Myrtle-Rockton association: Moderately deep and deep, gently sloping to moderately steep soils that have a loamy subsoil and substratum; on glaciated uplands
8	Dickinson-Meridian association: Deep, nearly level to sloping soils that have a loamy subsoil; underlain by outwash sand or sand and gravel

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U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
UNIVERSITY OF WISCONSIN, DEPARTMENT OF SOIL SCIENCE;
WISCONSIN GEOLOGICAL AND NATURAL HISTORY SURVEY;
AND WISCONSIN AGRICULTURAL EXPERIMENT STATION

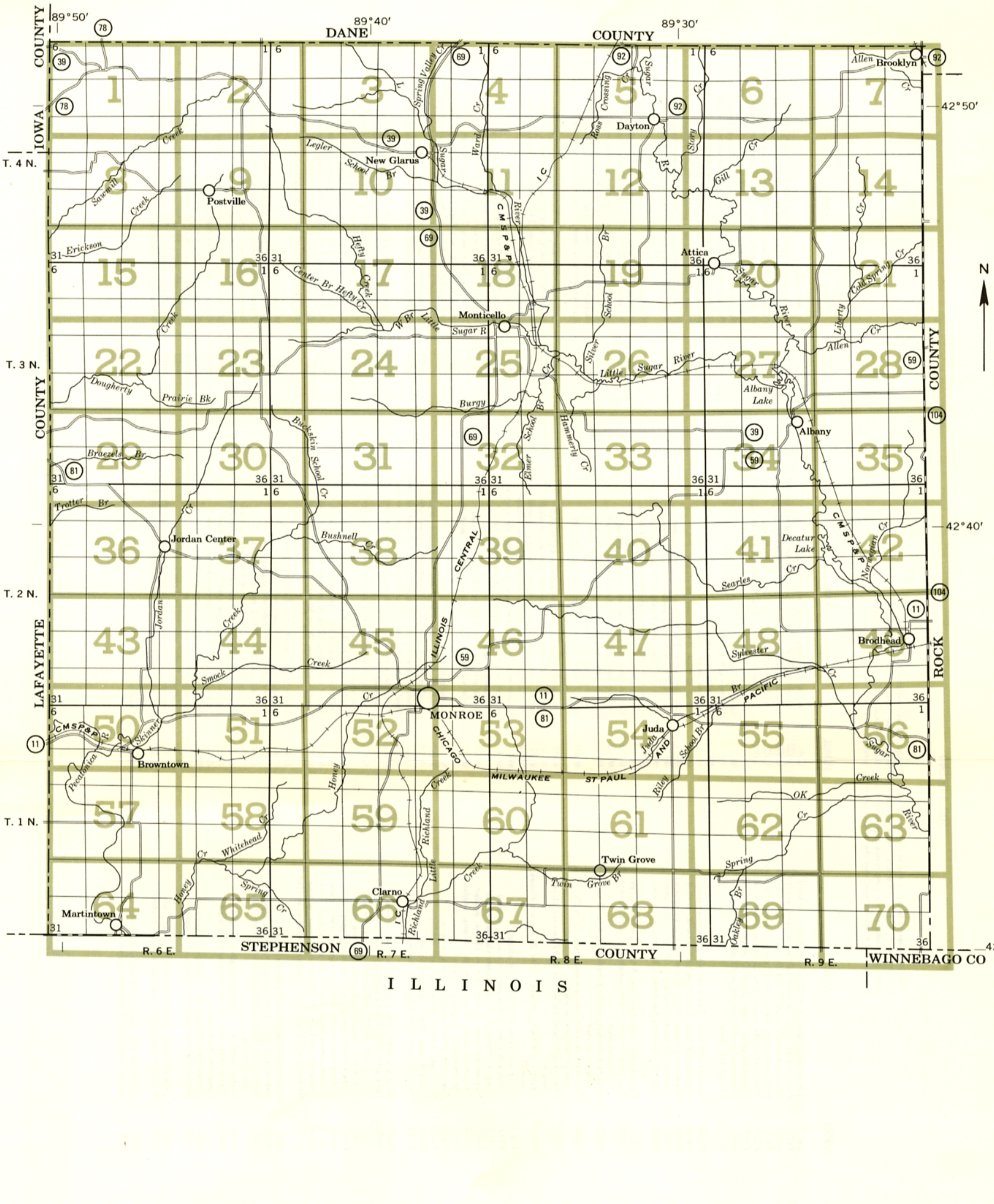
GENERAL SOIL MAP

GREEN COUNTY, WISCONSIN

Scale 1:190,080

1 0 1 2 3 4 Miles

This map is for general planning. It shows only the major soils and does not contain sufficient detail for operational planning.



INDEX TO MAP SHEETS

GREEN COUNTY, WISCONSIN

Scale 1:190,080

1 0 1 2 3 4 Miles

SOIL LEGEND

The first capital letter is the initial one of the soil name. A second capital letter, A, B, C, D, E, or F, shows the slope. Most symbols without a slope letter are for nearly level soils, but some are for land types that have a considerable range of slope. A final number, 2 or 3, in a symbol shows that the soil is eroded or severely eroded.

SYMBOL	NAME
Ac	Adrian muck
Ad	Alluvial land
Ae	Alluvial land, wet
An	Arenzville silt loam
ArB2	Arland loam, warm variant, 2 to 6 percent slopes, eroded
ArC2	Arland loam, warm variant, 6 to 12 percent slopes, eroded
ArD2	Arland loam, warm variant, 12 to 20 percent slopes, eroded
AsB2	Ashdale silt loam, 2 to 6 percent slopes, eroded
AsC2	Ashdale silt loam, 6 to 12 percent slopes, eroded
AsD2	Ashdale silt loam, 12 to 20 percent slopes, eroded
BIA	Billett sandy loam, 0 to 2 percent slopes
BIB2	Billett sandy loam, 2 to 6 percent slopes, eroded
BIC2	Billett sandy loam, 6 to 12 percent slopes, eroded
BoD	Boone fine sand, 2 to 20 percent slopes
Br	Brookston silt loam
CdB2	Cadiz silt loam, 2 to 6 percent slopes, eroded
CdC2	Cadiz silt loam, 6 to 12 percent slopes, eroded
ChB	Chaseburg silt loam, 2 to 6 percent slopes
ChC	Chaseburg silt loam, 6 to 12 percent slopes
Cn	Chaseburg and Arenzville silt loams
Co	Colwood silt loam
DaA	Dakota loam, 0 to 2 percent slopes
DaB2	Dakota loam, 2 to 6 percent slopes, eroded
DbA	Dells silt loam, 0 to 3 percent slopes
Dc	Del Rey silt loam
DdA	Dickinson sandy loam, 1 to 3 percent slopes
DeB2	Dodge silt loam, 2 to 6 percent slopes, eroded
DeC2	Dodge silt loam, 6 to 12 percent slopes, eroded
DgB2	Dodgeville silt loam, 2 to 6 percent slopes, eroded
DgC2	Dodgeville silt loam, 6 to 12 percent slopes, eroded
DgC3	Dodgeville silt loam, 6 to 12 percent slopes, severely eroded
DgD2	Dodgeville silt loam, 12 to 20 percent slopes, eroded
DoB2	Downs silt loam, 2 to 6 percent slopes, eroded
DoC2	Downs silt loam, 6 to 12 percent slopes, eroded
DsA	Downs silt loam, heavy substratum, 0 to 2 percent slopes
DsB	Downs silt loam, heavy substratum, 2 to 6 percent slopes
DsB2	Downs silt loam, heavy substratum, 2 to 6 percent slopes, eroded
DsC2	Downs silt loam, heavy substratum, 6 to 12 percent slopes, eroded
DuB2	Dunbarton silt loam, 2 to 6 percent slopes, eroded
DuC2	Dunbarton silt loam, 6 to 12 percent slopes, eroded
DuD2	Dunbarton silt loam, 12 to 20 percent slopes, eroded
DuE2	Dunbarton silt loam, 20 to 30 percent slopes, eroded
DvD3	Dunbarton silty clay loam, 10 to 20 percent slopes, severely eroded
DwB2	Durand silt loam, 2 to 6 percent slopes, eroded
DwC2	Durand silt loam, 6 to 12 percent slopes, eroded
EdB2	Edmund silt loam, 2 to 6 percent slopes, eroded
EdC2	Edmund silt loam, 6 to 12 percent slopes, eroded
EdD2	Edmund silt loam, 12 to 20 percent slopes, eroded
EeC2	Eleva sandy loam, 6 to 12 percent slopes, eroded
EeD2	Eleva sandy loam, 12 to 20 percent slopes, eroded
EIB2	Elkmound sandy loam, 2 to 6 percent slopes, eroded
EIC2	Elkmound sandy loam, 6 to 12 percent slopes, eroded
EID2	Elkmound sandy loam, 12 to 20 percent slopes, eroded
EIE2	Elkmound sandy loam, 20 to 30 percent slopes, eroded
EIF	Elkmound sandy loam, 30 to 45 percent slopes
Et	Ettrick silt loam
FaB2	Fayette silt loam, 2 to 6 percent slopes, eroded
FaC2	Fayette silt loam, 6 to 12 percent slopes, eroded
FaD2	Fayette silt loam, 12 to 20 percent slopes, eroded
FbA	Fayette silt loam, benches, 0 to 2 percent slopes
FbB2	Fayette silt loam, benches, 2 to 6 percent slopes, eroded
FbC	Fayette silt loam, benches, 6 to 12 percent slopes
FcB2	Fayette silt loam, loamy substratum, 2 to 6 percent slopes, eroded
FcC2	Fayette silt loam, loamy substratum, 6 to 12 percent slopes, eroded
FcD2	Fayette silt loam, loamy substratum, 12 to 20 percent slopes, eroded
FeC2	Fayette silt loam, valleys, 6 to 12 percent slopes, eroded
FeD2	Fayette silt loam, valleys, 12 to 20 percent slopes, eroded
FIA	Flagg silt loam, 0 to 2 percent slopes
FIB2	Flagg silt loam, 2 to 6 percent slopes, eroded
FIC2	Flagg silt loam, 6 to 12 percent slopes, eroded
FnC2	Fox sandy loam, 6 to 12 percent slopes, eroded
FnD2	Fox sandy loam, 12 to 20 percent slopes, eroded
FoA	Fox loam, 0 to 2 percent slopes
FoB2	Fox loam, 2 to 6 percent slopes, eroded
FoC2	Fox loam, 6 to 12 percent slopes, eroded
FsA	Fox silt loam, 0 to 2 percent slopes
FsB2	Fox silt loam, 2 to 6 percent slopes, eroded
GaB2	Gale silt loam, 2 to 6 percent slopes, eroded
GaC2	Gale silt loam, 6 to 12 percent slopes, eroded
GaD2	Gale silt loam, 12 to 20 percent slopes, eroded
GaE2	Gale silt loam, 20 to 30 percent slopes, eroded
GoA	Gotham loamy sand, 0 to 2 percent slopes
GoB2	Gotham loamy sand, 2 to 6 percent slopes, eroded
GoC2	Gotham loamy sand, 6 to 12 percent slopes, eroded
GrB2	Griswold silt loam, 2 to 6 percent slopes, eroded
GrC2	Griswold silt loam, 6 to 12 percent slopes, eroded
HbA	Hebron silt loam, 0 to 2 percent slopes
HbB2	Hebron silt loam, 2 to 6 percent slopes, eroded
HeA	Hebron silt loam, mottled subsoil variant, 0 to 3 percent slopes
HmB2	Hixton loam, 2 to 6 percent slopes, eroded
HmC2	Hixton loam, 6 to 12 percent slopes, eroded
Hu	Houghton mucky peat
HvA	Huntsville silt loam, 0 to 2 percent slopes
HvB	Huntsville silt loam, 2 to 6 percent slopes
JuB2	Juda silt loam, 2 to 6 percent slopes, eroded
JuC2	Juda silt loam, 6 to 12 percent slopes, eroded
LaB	Lamartine silt loam, 1 to 6 percent slopes
LeA	Lawler loam, 0 to 2 percent slopes
LIA	Lawler silt loam, 0 to 3 percent slopes
LnC2	Lindstrom sandy loam, 6 to 12 percent slopes, eroded
LnD2	Lindstrom sandy loam, 12 to 20 percent slopes, eroded
LsC	Lindstrom silt loam, 6 to 12 percent slopes
LsD2	Lindstrom silt loam, 12 to 20 percent slopes, eroded
Mb	Marshan loam
Mc	Marshan silt loam
Md	Matherton silt loam
Me	Maumee sandy loam
MIA	Meridian loam, 0 to 2 percent slopes
MIB2	Meridian loam, 2 to 6 percent slopes, eroded
MIC2	Meridian loam, 6 to 12 percent slopes, eroded
MmB2	Miami silt loam, 2 to 6 percent slopes, eroded
MmC2	Miami silt loam, 6 to 12 percent slopes, eroded
MmD2	Miami silt loam, 12 to 20 percent slopes, eroded
MnC2	Mifflin loam, 6 to 12 percent slopes, eroded
MnD2	Mifflin loam, 12 to 20 percent slopes, eroded
MoC2	Mifflin loam, shallow solum variant, 6 to 12 percent slopes, eroded
MoD2	Mifflin loam, shallow solum variant, 12 to 20 percent slopes, eroded
MrB2	Morley silt loam, 2 to 6 percent slopes, eroded
MrC2	Morley silt loam, 6 to 12 percent slopes, eroded
MrD2	Morley silt loam, 12 to 20 percent slopes, eroded
MsB2	Muscatine silt loam, 2 to 6 percent slopes, eroded
MtA	Muscatine silt loam, benches, 0 to 3 percent slopes
MuA	Muscatine silt loam, loamy substratum, 0 to 3 percent slopes
MyB2	Myrtle silt loam, 2 to 6 percent slopes, eroded
MyC2	Myrtle silt loam, 6 to 12 percent slopes, eroded
Na	Navan silt loam
NgB2	NewGlarus silt loam, 2 to 6 percent slopes, eroded
NgC2	NewGlarus silt loam, 6 to 12 percent slopes, eroded
NgD2	NewGlarus silt loam, 12 to 20 percent slopes, eroded
NgE2	NewGlarus silt loam, 20 to 30 percent slopes, eroded
NIC3	NewGlarus soils, 6 to 12 percent slopes, severely eroded
NID3	NewGlarus soils, 12 to 20 percent slopes, severely eroded
NoB2	Northfield loam, 2 to 6 percent slopes, eroded
NoC2	Northfield loam, 6 to 12 percent slopes, eroded
NoD2	Northfield loam, 12 to 20 percent slopes, eroded
NoE2	Northfield loam, 20 to 30 percent slopes, eroded
OcA	Ockley sandy loam, 0 to 3 percent slopes
OeA	Ockley loam, 0 to 2 percent slopes
OeB	Ockley loam, 2 to 6 percent slopes
OkA	Ockley silt loam, 0 to 2 percent slopes
OkB2	Ockley silt loam, 2 to 6 percent slopes, eroded
OkC2	Ockley silt loam, 6 to 12 percent slopes, eroded
OIB2	Ogle silt loam, 2 to 6 percent slopes, eroded
OIC2	Ogle silt loam, 6 to 12 percent slopes, eroded
OnA	Orion silt loam, 0 to 3 percent slopes
Or	Orion silt loam, wet variant
OsA	Oshtemo loamy sand, 0 to 2 percent slopes
OsB2	Oshtemo loamy sand, 2 to 6 percent slopes, eroded
OsC2	Oshtemo loamy sand, 6 to 12 percent slopes, eroded
Ot	Ossian silt loam
Ou	Otter silt loam
Pa	Palms muck
PgB2	Palsgrove silt loam, 2 to 6 percent slopes, eroded
PgC2	Palsgrove silt loam, 6 to 12 percent slopes, eroded
PgD2	Palsgrove silt loam, 12 to 20 percent slopes, eroded
PID3	Palsgrove silty clay loam, 12 to 20 percent slopes, severely eroded
PnB2	Pecatonica silt loam, 2 to 6 percent slopes, eroded
PnC2	Pecatonica silt loam, 6 to 12 percent slopes, eroded
PnD2	Pecatonica silt loam, 12 to 20 percent slopes, eroded
PoA	Pillot silt loam, 0 to 2 percent slopes
PoB2	Pillot silt loam, 2 to 6 percent slopes, eroded
PoC2	Pillot silt loam, 6 to 12 percent slopes, eroded
PrB2	Plainfield loamy sand, 0 to 6 percent slopes, eroded
Rh	Riverwash
RkC2	Rockton loam, 6 to 12 percent slopes, eroded
RkD2	Rockton loam, 12 to 20 percent slopes, eroded
RnB2	Rockton silt loam, 2 to 6 percent slopes, eroded
RnC2	Rockton silt loam, 6 to 12 percent slopes, eroded
RoC	Rodman gravelly loam, 2 to 12 percent slopes
RoE	Rodman gravelly loam, 12 to 30 percent slopes
SaB2	Saybrook silt loam, 2 to 6 percent slopes, eroded
SaC2	Saybrook silt loam, 6 to 12 percent slopes, eroded
ScB2	Saylesville silt loam, 2 to 6 percent slopes, eroded
Se	Sebewa silt loam
SfA	Shiffer loam, 0 to 3 percent slopes
SoC	Sogn silt loam, 2 to 12 percent slopes
SoE	Sogn silt loam, 12 to 30 percent slopes
Sp	Steep stony and rocky land
SsB	Stronghurst silt loam, 2 to 6 percent slopes
StA	Stronghurst silt loam, benches, 0 to 3 percent slopes
SuA	Stronghurst silt loam, loamy substratum, 0 to 3 percent slopes
SyB2	Sylvester silt loam, 2 to 6 percent slopes, eroded
SyC2	Sylvester silt loam, 6 to 12 percent slopes, eroded
TaB2	Tama silt loam, 2 to 6 percent slopes, eroded
TaC2	Tama silt loam, 6 to 12 percent slopes, eroded
TbA	Tama silt loam, benches, 0 to 2 percent slopes
TbB	Tama silt loam, benches, 2 to 6 percent slopes
TcA	Tell silt loam, 0 to 2 percent slopes
TcB2	Tell silt loam, 2 to 6 percent slopes, eroded
TcC2	Tell silt loam, 6 to 12 percent slopes, eroded
Te	Terrace escarpments
ThA	Thackery silt loam, 0 to 3 percent slopes
Wa	Wallkill silt loam
WdC2	Westville loam, 6 to 12 percent slopes, eroded
WeB2	Westville silt loam, 2 to 6 percent slopes, eroded
WeC2	Westville silt loam, 6 to 12 percent slopes, eroded
WeD2	Westville silt loam, 12 to 20 percent slopes, eroded
WhB2	Whalan loam, 2 to 6 percent slopes, eroded
WhC2	Whalan loam, 6 to 12 percent slopes, eroded
WIB2	Whalan silt loam, 2 to 6 percent slopes, eroded
WIC2	Whalan silt loam, 6 to 12 percent slopes, eroded
WID2	Whalan silt loam, 12 to 20 percent slopes, eroded
WnB2	Winnebago silt loam, 2 to 6 percent slopes, eroded
WnC2	Winnebago silt loam, 6 to 12 percent slopes, eroded

GREEN COUNTY, WISCONSIN — SHEET NUMBER 1

1

2

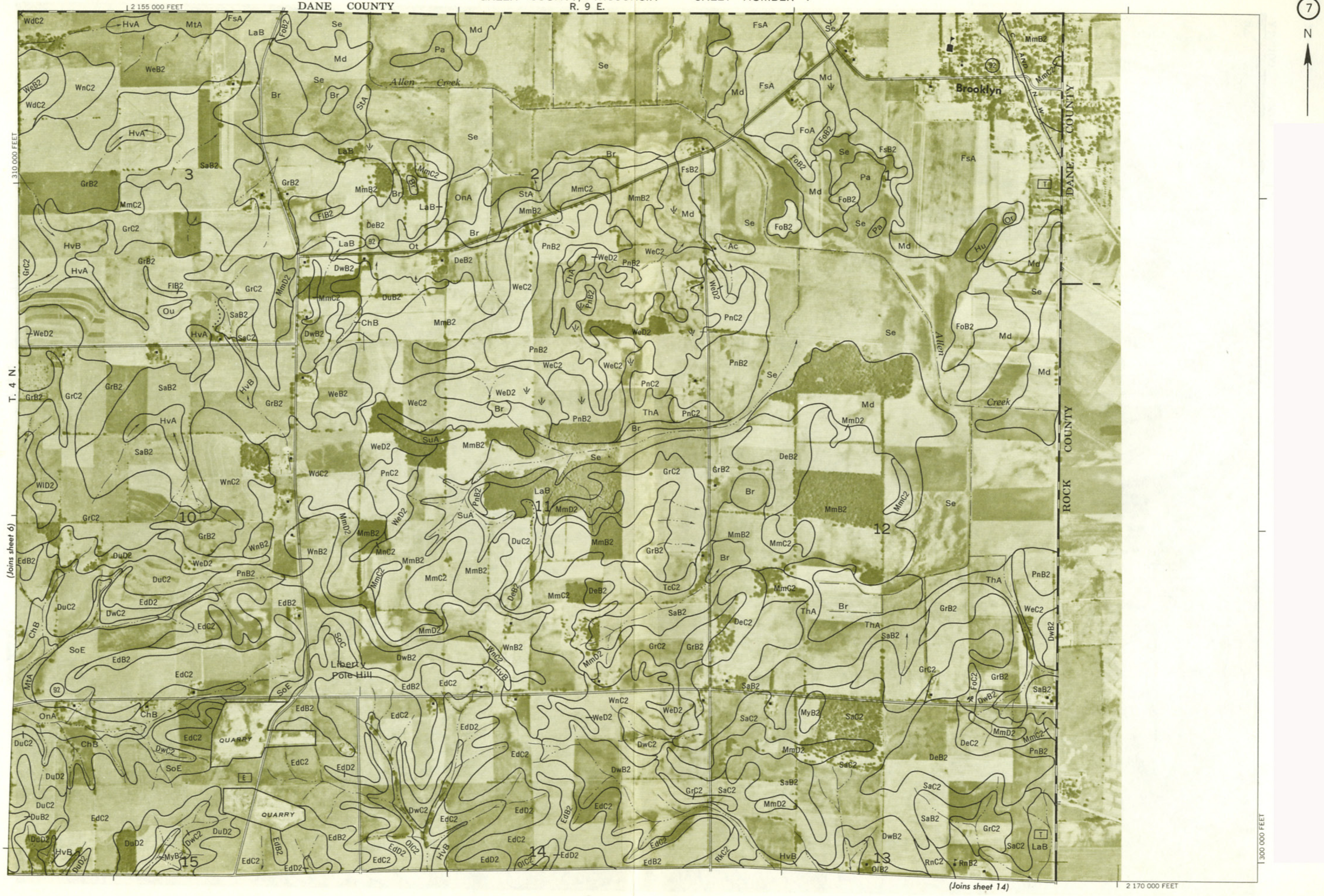
GREEN COUNTY, WISCONSIN — SHEET NUMBER 2

GREEN COUNTY, WISCONSIN — SHEET NUMBER 3

GREEN COUNTY, WISCONSIN — SHEET NUMBER 4


DANE COUNTY
R. 8 E.
2 120 000 FEET
310 000 FEET
T. 4 N.
(Joins sheet 4)
(Joins sheet 6)
(Joins sheet 12)
300 000 FEET
2 135 000 FEET
N
Ross Crossing
Dayton
SUGAR RIVER
ST JAMES CEMETERY
QUARRY
ILLINOIS CENTRAL
Ross Crossing

GREEN COUNTY, WISCONSIN — SHEET NUMBER 6



7
N
DANE COUNTY
R. 9 E.
2 155 000 FEET
310 000 FEET
T. 4 N.
(Joins sheet 6)
Allen Creek
Brooklyn
DANE COUNTY
ROCK COUNTY
Liberty Pole Hill
QUARRY
QUARRY
(Joins sheet 14)
2 170 000 FEET
300 000 FEET

GREEN COUNTY, WISCONSIN — SHEET NUMBER 8


2 065 000 FEET
R. 6 E. | R. 7 E.
(Joins sheet 2)
N
295 000 FEET
T. 4 N.
(Joins sheet 8)
(Joins sheet 10)
290 000 FEET
(Joins sheet 16)
2 080 000 FEET
GREENS PRAIRIE CEMETERY
Postville
Dougherty Creek
Honey Creek
Searles
13
14
15
18
19
22
23
24
25
26
27
30


10
N
(Joins sheet 3)
(Joins sheet 9)
(Joins sheet 11)
(Joins sheet 17)
R. 7 E.
T. 4 N.
2 095 000 FEET
2 085 000 FEET
295 000 FEET
290 000 FEET
New Glarus
SWISS CEMETERY
EVANGELICAL CEMETERY
Durst Valley
Legler School Branch
Hefty Creek
NEW GLARUS WOODS STATE PARK


R. 7 E. | R. 8 E.
2 100 000 FEET
(Joins sheet 4)
N
New Glarus
Little Sugar River
Ward Creek
CHICAGO MILWAUKEE ST PAUL AND PACIFIC
ILLINOIS CENTRAL
Exeter
NEW GLARUS WOODS STATE PARK
Little Sugar River
T. 4 N.
295 000 FEET
(Joins sheet 10)
(Joins sheet 12)
290 000 FEET
(Joins sheet 18)
2 115 000 FEET
14
13
18
17
23
24
19
20
26
25
30
29


12
N
(Joins sheet 5)
R. 8 E.
2 135 000 FEET
(Joins sheet 11)
(Joins sheet 13)
T. 4 N.
295 000 FEET
290 000 FEET
(Joins sheet 19)
2 120 000 FEET
Ross Crossing Cr.
CENTRAL
ILLINOIS
SUGAR RIVER
SUGAR RIVER
Story Creek
GRAVEL PIT
13
14
15
16
21
22
23
24
25
26
27
28

GREEN COUNTY, WISCONSIN — SHEET NUMBER 13

14

GREEN COUNTY, WISCONSIN — SHEET NUMBER 14

15

N


R. 6 E.
2 045 000 FEET
(Joins sheet 8)
285 000 FEET
T. 4 N.
T. 3 N.
LAFAYETTE COUNTY
(Joins sheet 16)
275 000 FEET
(Joins sheet 22)
2 060 000 FEET
Sawmill Creek
Erickson Creek
Yankee Hollow
Brennan Creek
Dougherty Creek
Adams Church
31
32
33
34
6
5
4
3
7
8
9
10


N
(Joins sheet 9)
(Joins sheet 15)
(Joins sheet 17)
(Joins sheet 23)
R. 6 E.
R. 7 E.
T. 4 N.
T. 3 N.
2 080 000 FEET
2 065 000 FEET
285 000 FEET
275 000 FEET
34
35
36
31
3
2
1
6
10
11
12
7
Dougherty Creek
Center Branch
Hefty Creek

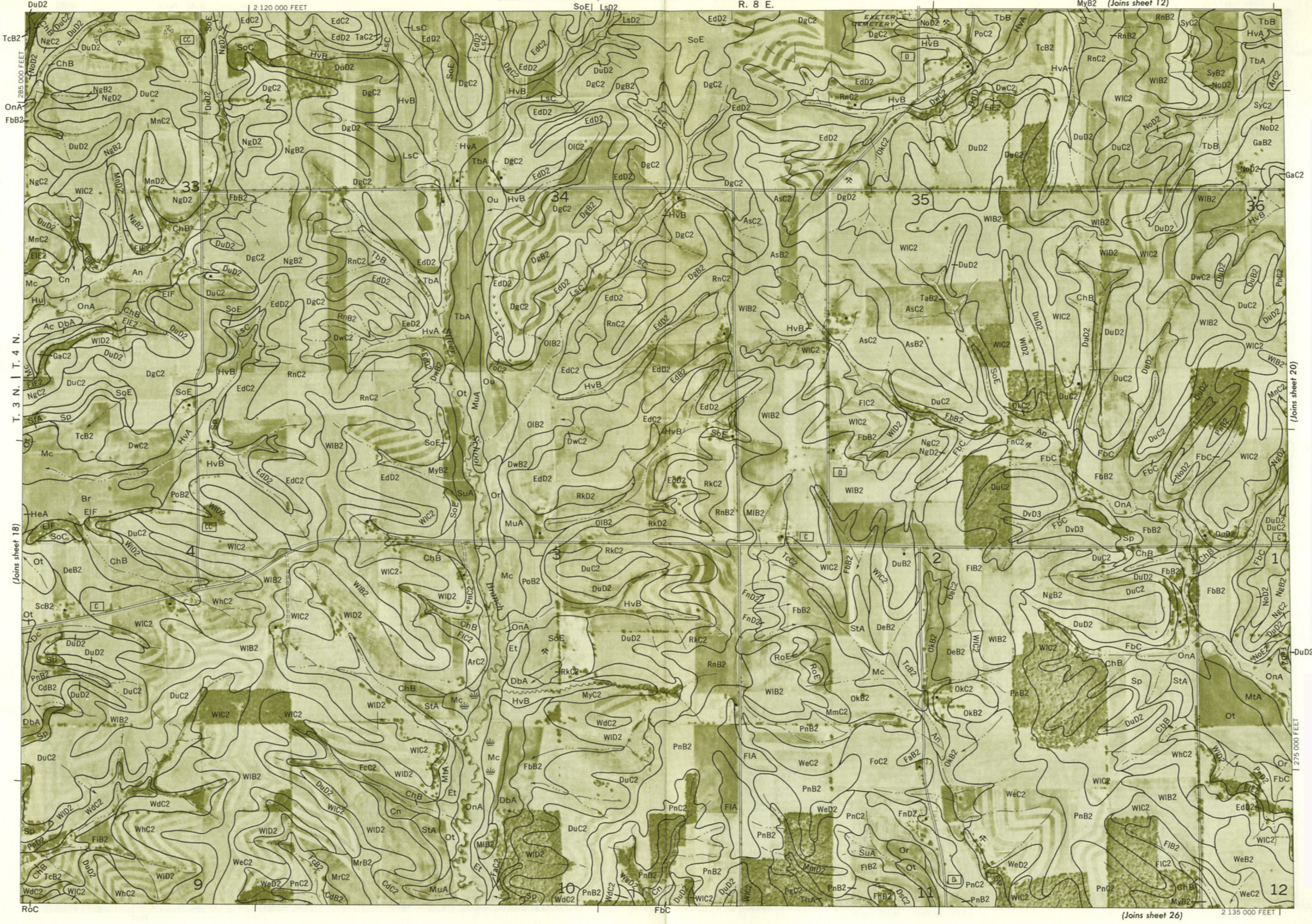
GREEN COUNTY, WISCONSIN — SHEET NUMBER 17

17

N

N


(Joins sheet 11)
R. 7 E. | R. 8 E.
2 115 000 FEET
285 000 FEET
T. 4 N. | T. 3 N.
(Joins sheet 19)
(Joins sheet 17)
275 000 FEET
2 100 000 FEET
(Joins sheet 25)
CHICAGO MILWAUKEE ST PAUL AND PACIFIC
ILLINOIS CENTRAL
Little Sugar River
W Br Little Sugar R
Monticello
35
36
31
32
2
1
6
5
11
12
7
8


N
2 120 000 FEET
R. 8 E.
MyB2 (Joins sheet 12)
285 000 FEET
T. 3 N. | T. 4 N.
(Joins sheet 18)
(Joins sheet 20)
275 000 FEET
(Joins sheet 26)
2 135 000 FEET
EXETER CEMETERY
33
34
35
36
4
3
2
1
9
10
11
12


N
(Joins sheet 13)
R. 8 E.
R. 9 E.
2 150 000 FEET
285 000 FEET
(Joins sheet 19)
(Joins sheet 21)
T. 4 N.
T. 3 N.
275 000 FEET
(Joins sheet 27)
2 140 000 FEET
SUGAR RIVER
Attica
QUARRY
36
31
32
33
1
6
5
4
12
7
8
9


21
N
R. 9 E.
2 155 000 FEET
285 000 FEET
(Joins sheet 14)
(Joins sheet 20)
(Joins sheet 28)
2 170 000 FEET
275 000 FEET
T. 4 N.
T. 3 N.
PEACE CHURCH CEMETERY
ROCK COUNTY
Liberty Creek
Cold Spring Creek
34
35
36
3
2
1
10
11
12
DuD2
DuC2
SoE
WID2
BIB2
EIE2

N

GREEN COUNTY, WISCONSIN — SHEET NUMBER 22

(Joins sheet 15)

(Joins sheet 29)

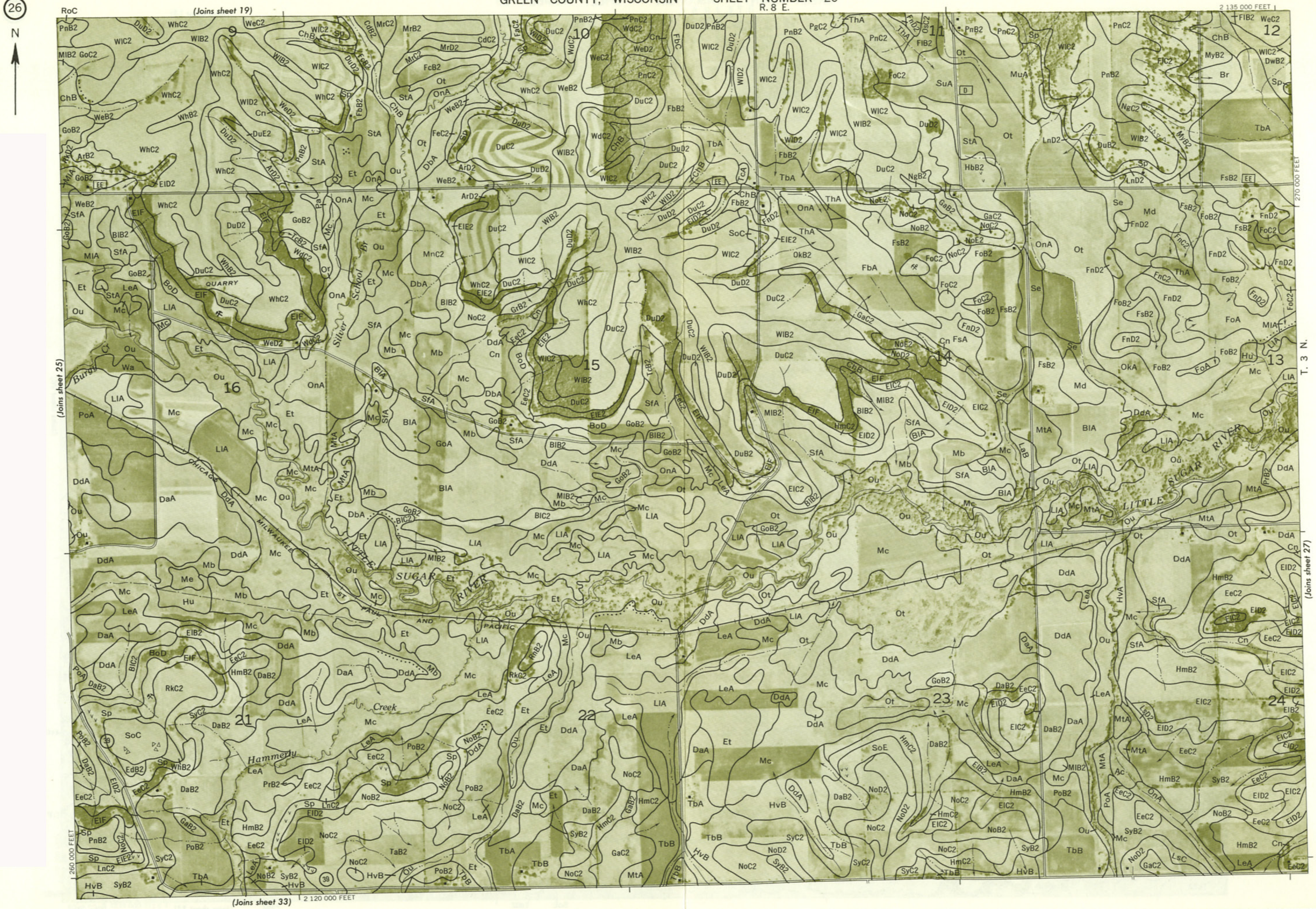

2 065 000 FEET
R. 6 E.
R. 7 E.
(Joins sheet 16)
N
270 000 FEET
T. 3 N.
(Joins sheet 22)
(Joins sheet 24)
(Joins sheet 30)
2 080 000 FEET
260 000 FEET
South Branch Honey Creek
QUARRY
SHOOKS PRAIRIE CEMETERY
Prairie Brook
Jordan Creek
10
11
12
7
13
14
15
18
19
22
23
24


N
(Joins sheet 17)
R. 7 E.
2 095 000 FEET
270 000 FEET
T. 3 N.
(Joins sheet 23)
(Joins sheet 25)
(Joins sheet 31)
2 085 000 FEET
260 000 FEET
South Branch Hefty Creek
Hefty Cr
Center Br
W Br Little Sugar R
Washington Church
Burgy Creek
Burgy Cr.
BENKERT CEMETERY
8
9
10
11
14
15
16
17
20
21
22
23

25


2 100 000 FEET
R. 7 E. | R. 8 E.
(Joins sheet 18)
N
Monticello
West Branch Little Sugar River
West Branch
Little Sugar River
QUARRY
HIGHLAND CEMETERY
CHICAGO MILWAUKEE ST PAUL AND PACIFIC
ILLINOIS CENTRAL
Burgy Creek
Ward School
270 000 FEET
T. 3 N.
(Joins sheet 24)
(Joins sheet 26)
(Joins sheet 32)
2 115 000 FEET
260 000 FEET
Creek

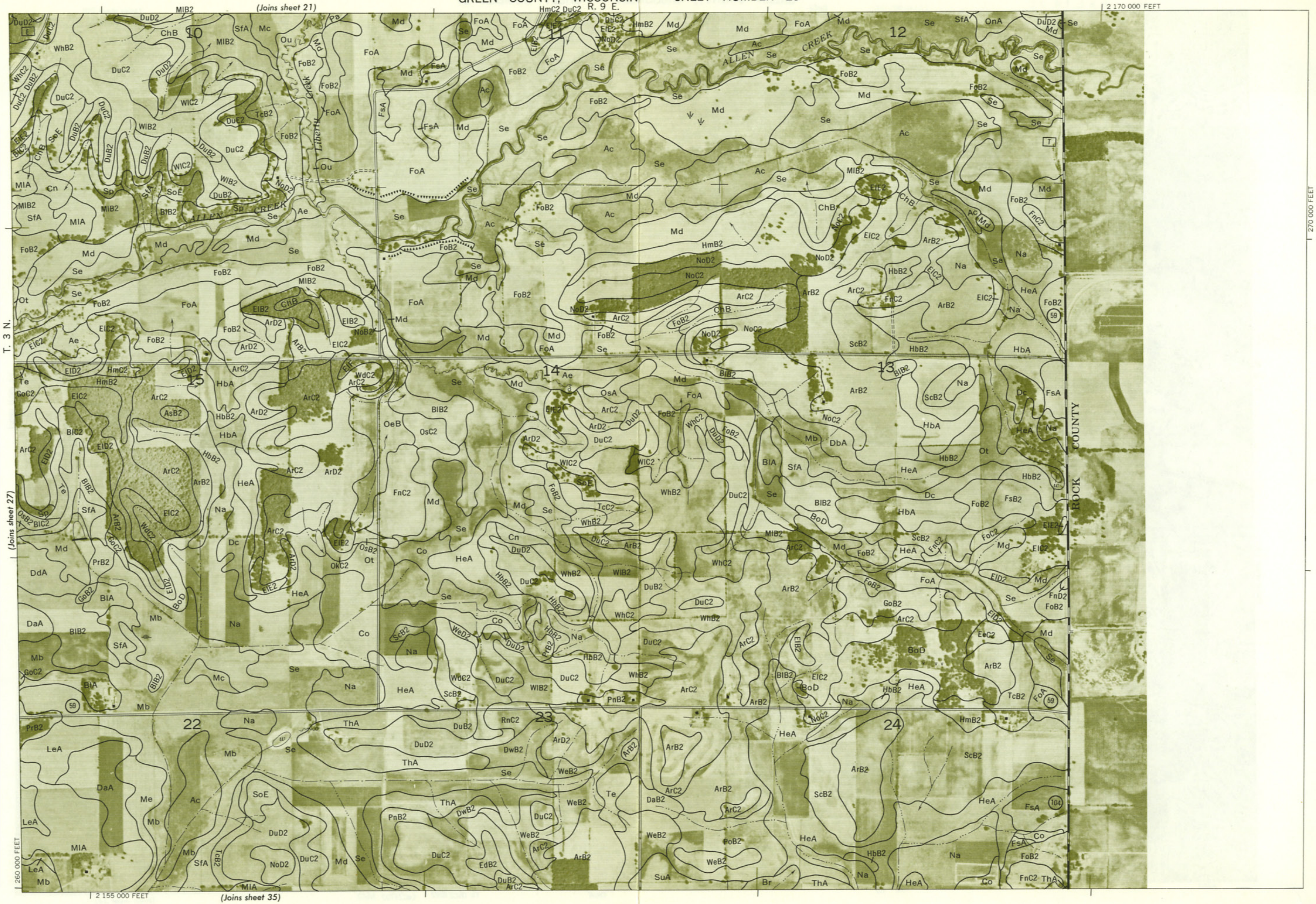
GREEN COUNTY, WISCONSIN — SHEET NUMBER 26




R. 8 E. | R. 9 E.
2 140 000 FEET
(Joins sheet 20)
270 000 FEET
T. 3 N.
(Joins sheet 26)
(Joins sheet 28)
(Joins sheet 34)
2 150 000 FEET
260 000 FEET
N
LITTLE SUGAR RIVER
SUGAR RIVER
ALLEN CREEK
CHICAGO MILWAUKEE ST. PAUL AND PACIFIC
Albany Lake
Albany
12
7
8
9
13
18
17
16
24
19
20
21

GREEN COUNTY, WISCONSIN — SHEET NUMBER 28

N




2 045 000 FEET
R. 6 E.
(Joins sheet 22)
N
255 000 FEET
LAFAYETTE COUNTY
(Joins sheet 30)
250 000 FEET
T. 3 N.
T. 2 N.
Braezels
Branch
(Joins sheet 36)
2 060 000 FEET
30
29
28
27
31
32
33
34
6
5
4
3

GREEN COUNTY, WISCONSIN — SHEET NUMBER 30

31


N
2 085 000 FEET
R. 7 E.
(Joins sheet 24)
(Joins sheet 32)
(Joins sheet 30)
(Joins sheet 38)
255 000 FEET
250 000 FEET
2 095 000 FEET
T. 2 N. | T. 3 N.
Buckskin Creek
Buckskin School
School Creek
Burgy Creek
QUARRY
29
28
27
26
32
33
34
35
5
4
3
2
DgC2
SoE
DgD2
SoC
NgC2
NgD2
HvB
AsC2
AsD2
EdD2
DgB2


N
(Joins sheet 25)
R. 7 E. | R. 8 E.
2 115 000 FEET
(Joins sheet 31)
(Joins sheet 33)
(Joins sheet 39)
255 000 FEET
250 000 FEET
2 100 000 FEET
T. 2 N. | T. 3 N.
Burgy Cr.
Schultz
CENTRAL
ILLINOIS
Elmer School Branch
25
26
29
30
31
32
35
36
1
2
5
6

GREEN COUNTY, WISCONSIN — SHEET NUMBER 33

GREEN COUNTY, WISCONSIN — SHEET NUMBER 34

GREEN COUNTY, WISCONSIN — SHEET NUMBER 35

GREEN COUNTY, WISCONSIN — SHEET NUMBER 36

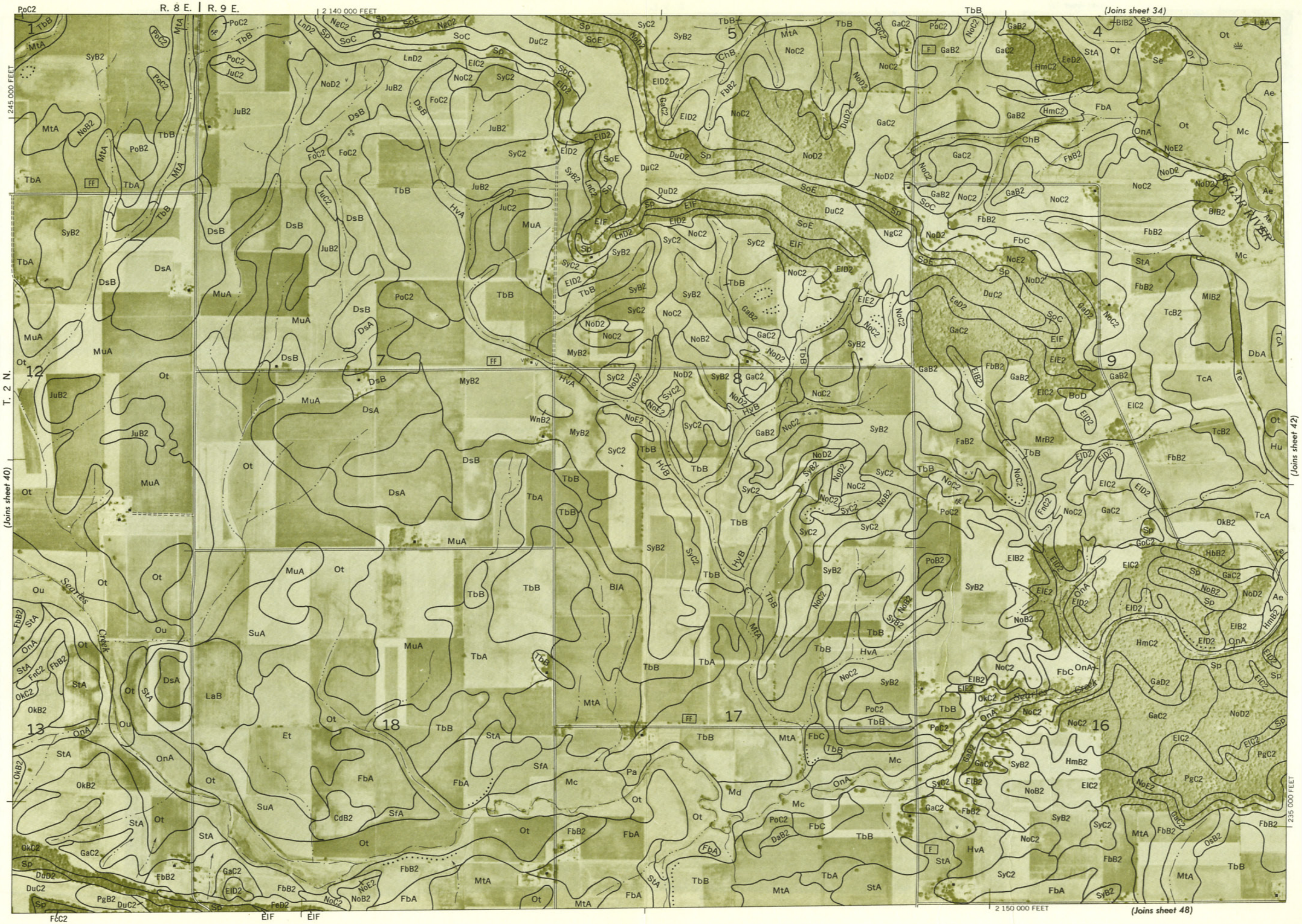

R. 6 E. | R. 7 E.
(Joins sheet 30)
(Joins sheet 38)
(Joins sheet 44)
(Joins sheet 36)
2 065 000 FEET
2 080 000 FEET
245 000 FEET
235 000 FEET
T. 2 N.
N
Jordan Creek
Buckskin School
Bushnell Creek
Blackford School
Skinner Creek
81

GREEN COUNTY, WISCONSIN — SHEET NUMBER 38


R. 7 E. | R. 8 E.
(Joins sheet 32)
(Joins sheet 38)
(Joins sheet 40)
(Joins sheet 46)
T. 2 N.
2 100 000 FEET
245 000 FEET
235 000 FEET
2 115 000 FEET
Stearns
Substation
QUARRY
DUTCH HOLLOW CEMETERY
Bushnell
ILLINOIS CENTRAL
N

N

GREEN COUNTY, WISCONSIN — SHEET NUMBER 40


N
R. 8 E. | R. 9 E.
2 140 000 FEET
(Joins sheet 34)
245 000 FEET
T. 2 N.
(Joins sheet 40)
(Joins sheet 42)
235 000 FEET
2 150 000 FEET
(Joins sheet 48)
1
4
5
6
7
8
9
12
13
16
17
18
SUGAR RIVER
Searles Creek


N
(Joins sheet 35)
R. 9 E.
2 170 000 FEET
245 000 FEET
(Joins sheet 41)
T. 2 N.
235 000 FEET
2 155 000 FEET
(Joins sheet 49)
SUGAR RIVER
Decatur Lake
Norwegian Creek
CHICAGO MILWAUKEE ST PAUL AND PACIFIC
GRAVEL PIT
ROCK COUNTY

GREEN COUNTY, WISCONSIN — SHEET NUMBER 43

43

GREEN COUNTY, WISCONSIN — SHEET NUMBER 44

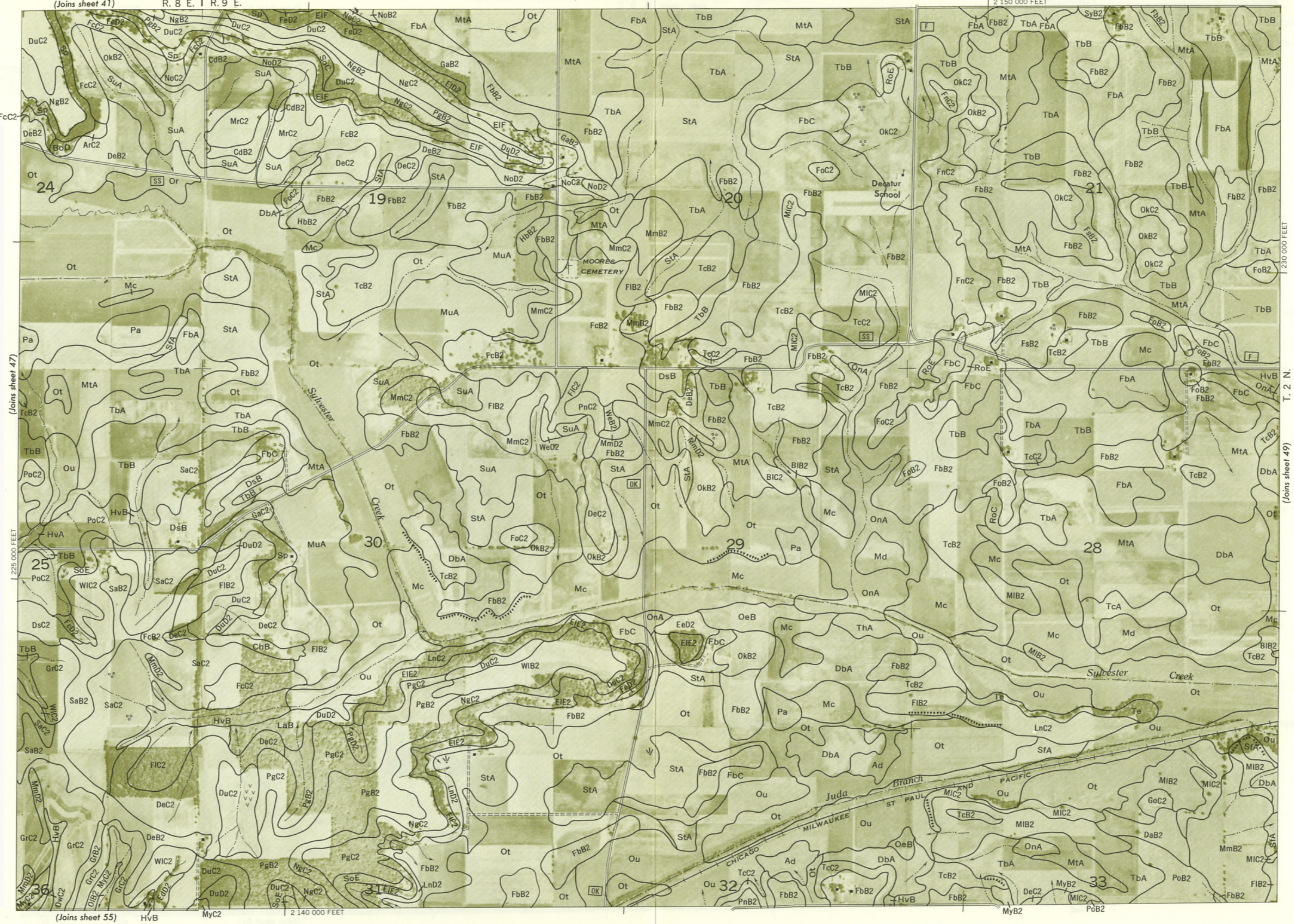

N
R. 7 E.
T. 2 N.
2 085 000 FEET
2 095 000 FEET
230 000 FEET
225 000 FEET
HvB (Joins sheet 38)
(Joins sheet 45)
(Joins sheet 44)
(Joins sheet 52)
20
21
22
23
26
27
28
29
32
33
34
35
School
County Farm
Smock Creek
Honey Creek
ILLINOIS CENTRAL
MONROE
(county seat)
81
69
59
11
N
Y

N

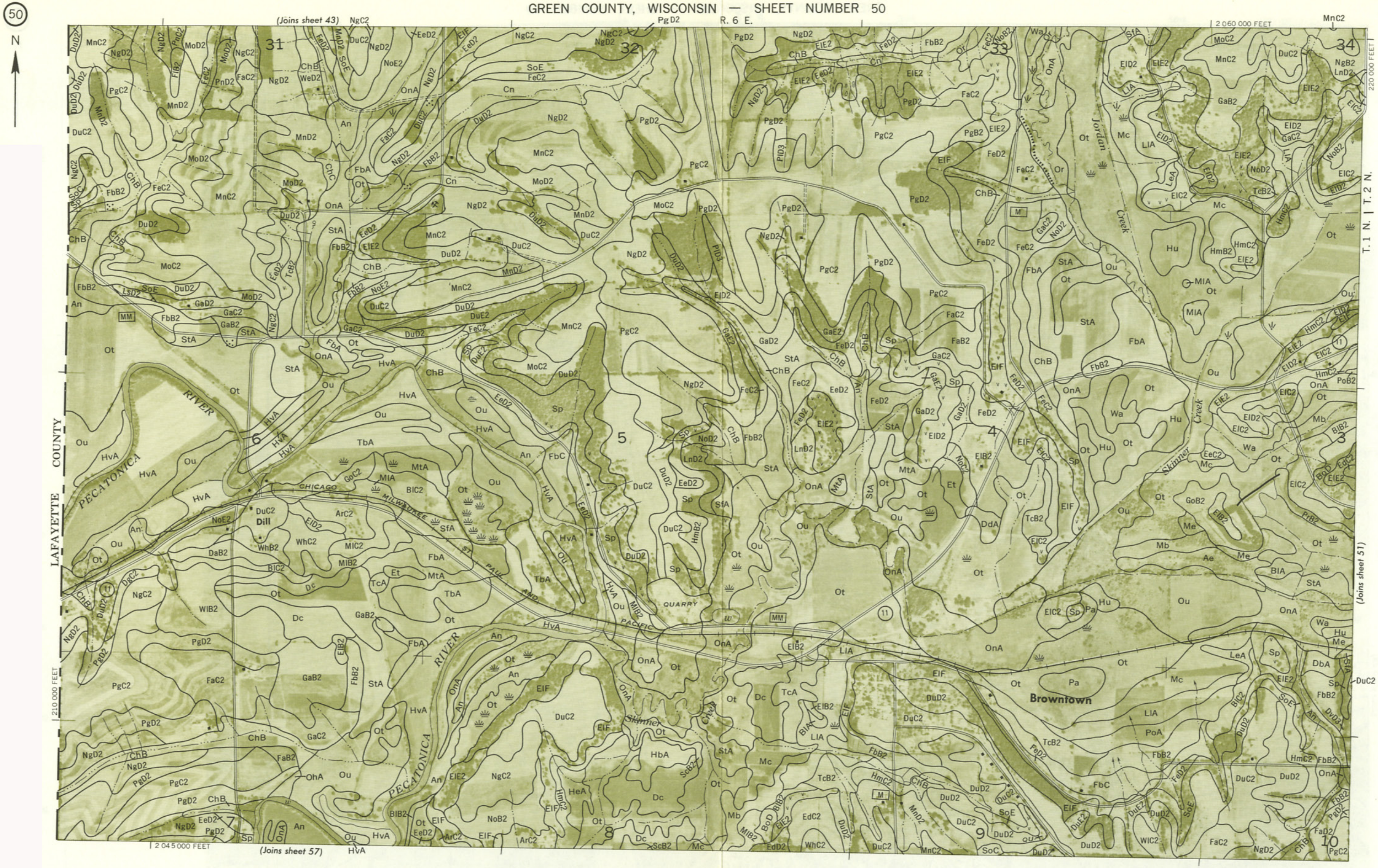

(Joins sheet 39)
R. 7 E. | R. 8 E.
2 115 000 FEET
Sylvester Creek
ILLINOIS CENTRAL
QUARRY
QUARRY
T. 2 N.
230 000 FEET
225 000 FEET
(Joins sheet 45)
(Joins sheet 47)
MONROE
(county seat)
2 100 000 FEET
(Joins sheet 53)
19
20
23
24
25
26
29
30
31
32
35
36

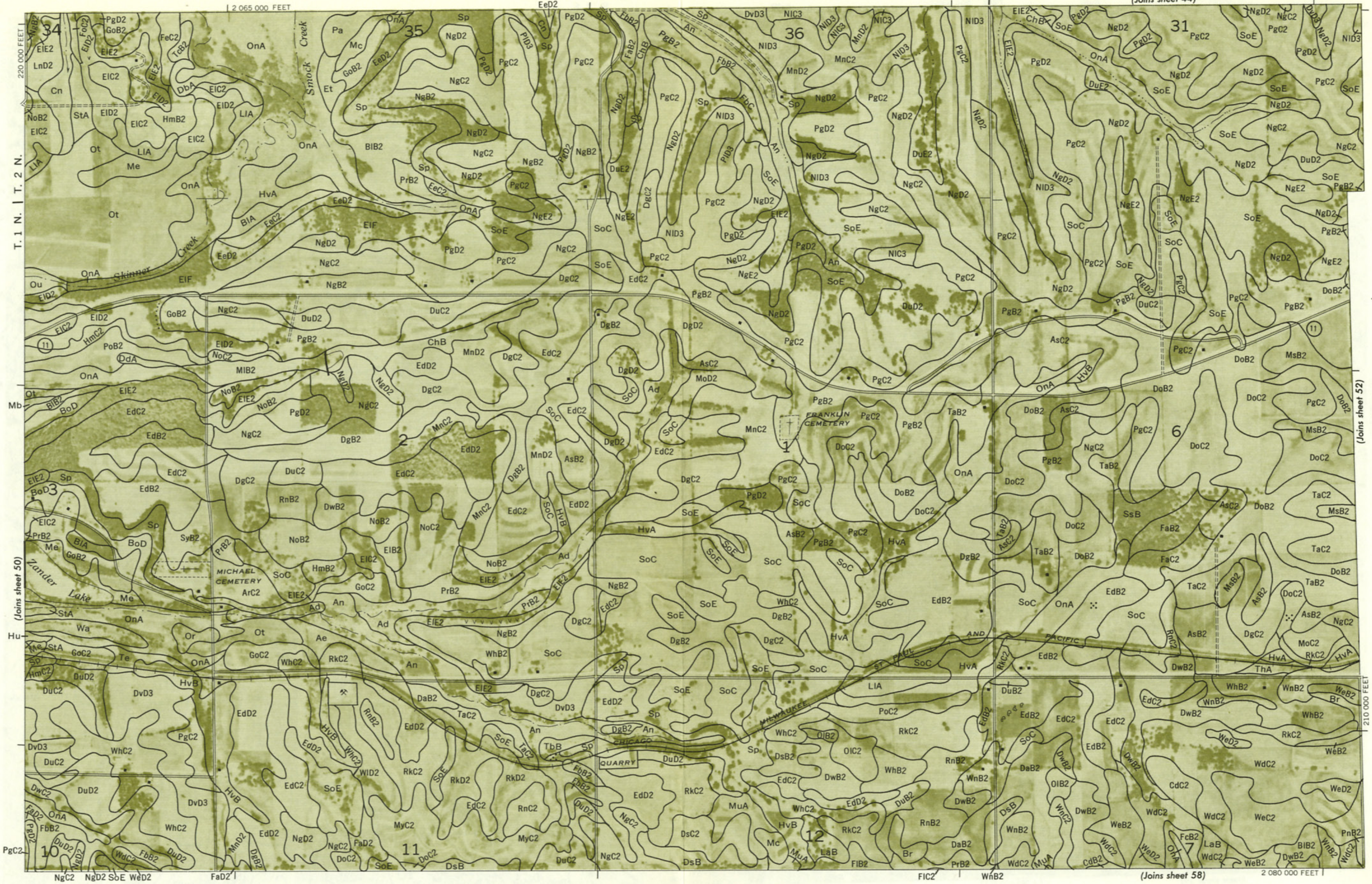

47
N
R. 8 E.
T. 2 N.
2 120 000 FEET
230 000 FEET
225 000 FEET
2 135 000 FEET
(Joins sheet 40)
(Joins sheet 48)
(Joins sheet 54)
(Joins sheet 46)
Sylvester Creek
21
22
23
24
25
26
27
28
33
34
35
36

GREEN COUNTY, WISCONSIN — SHEET NUMBER 48

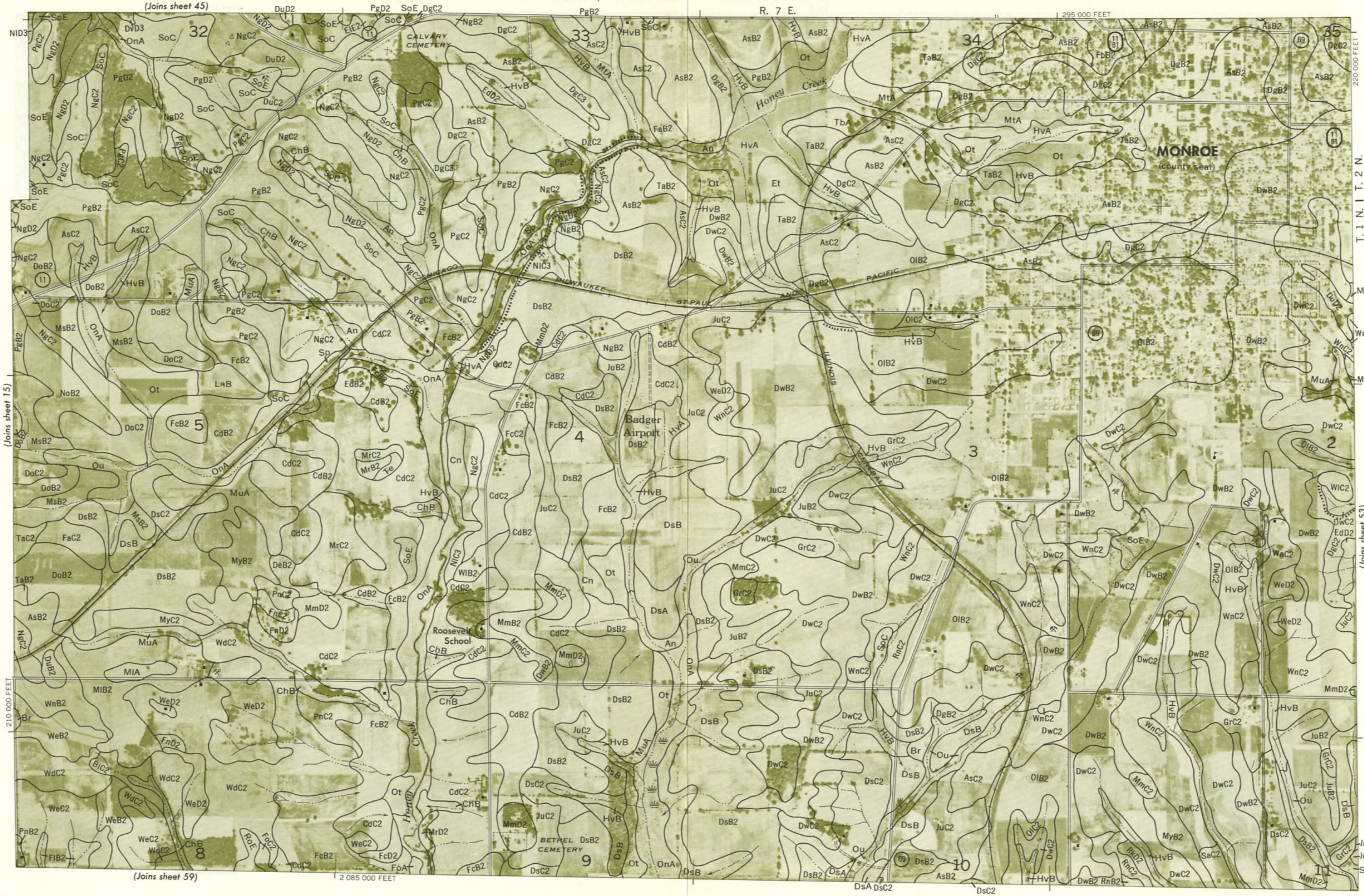



2 155 000 FEET
R. 9 E.
(Joins sheet 42)
N
230 000 FEET
T. 2 N.
(Joins sheet 48)
225 000 FEET
(Joins sheet 56)
2 170 000 FEET
SUGAR RIVER
DECATUR CEMETERY
BRODHEAD
ROCK COUNTY
CHICAGO MILWAUKEE ST PAUL AND PACIFIC
GRAVEL PIT
Sylvester Creek
22
23
24
25
26
27
34
35
36
104
11


N
(Joins sheet 43)
R. 6 E.
2 060 000 FEET
220 000 FEET
T. 1 N. | T. 2 N.
(Joins sheet 51)
(Joins sheet 57)
2 045 000 FEET
210 000 FEET
LAFAYETTE COUNTY
PECATONICA RIVER
Jordan Creek
Skinner Creek
CHICAGO MILWAUKEE ST. PAUL AND PACIFIC
QUARRY
Dill
Browntown
31
32
33
34
6
5
4
3
7
8
9
10


(Joins sheet 44)
(Joins sheet 52)
(Joins sheet 58)
(Joins sheet 50)
R. 6 E.
R. 7 E.
T. 2 N.
T. 1 N.
N
2 065 000 FEET
2 080 000 FEET
220 000 FEET
210 000 FEET
Smock Creek
Skinner Creek
Zander Lake
FRANKLIN CEMETERY
MICHAEL CEMETERY
QUARRY
CHICAGO MILWAUKEE ST. PAUL AND PACIFIC

GREEN COUNTY, WISCONSIN — SHEET NUMBER 52

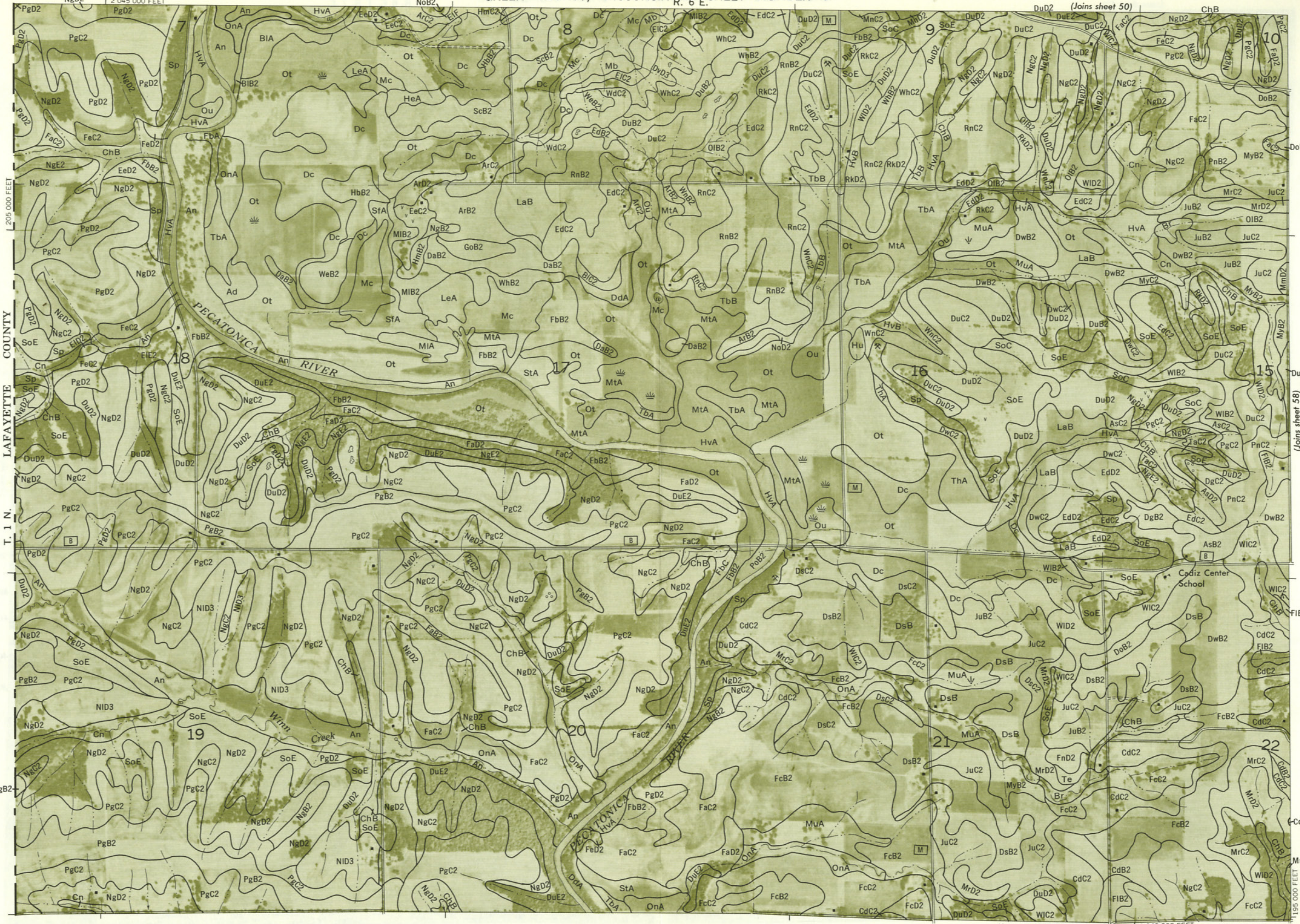


GREEN COUNTY, WISCONSIN — SHEET NUMBER 53

GREEN COUNTY, WISCONSIN — SHEET NUMBER 54


R. 8 E. | R. 9 E.
2 140 000 FEET
(Joins sheet 48)
N
T. 1 N. | T. 2 N.
220 000 FEET
CHICAGO MILWAUKEE ST PAUL AND PACIFIC
Juda Branch
Riley School Branch
GRAVEL PIT
Davis School
(Joins sheet 54)
(Joins sheet 56)
210 000 FEET
2 150 000 FEET
(Joins sheet 62)

GREEN COUNTY, WISCONSIN — SHEET NUMBER 56


R. 6 E.
(Joins sheet 50)
(Joins sheet 58)
(Joins sheet 64)
LAFAYETTE COUNTY
T. 1 N.
N
2 045 000 FEET
2 060 000 FEET
205 000 FEET
195 000 FEET
PECATONICA RIVER
Winn Creek
Cadiz Center School
7
8
9
10
15
16
17
18
19
20
21
22

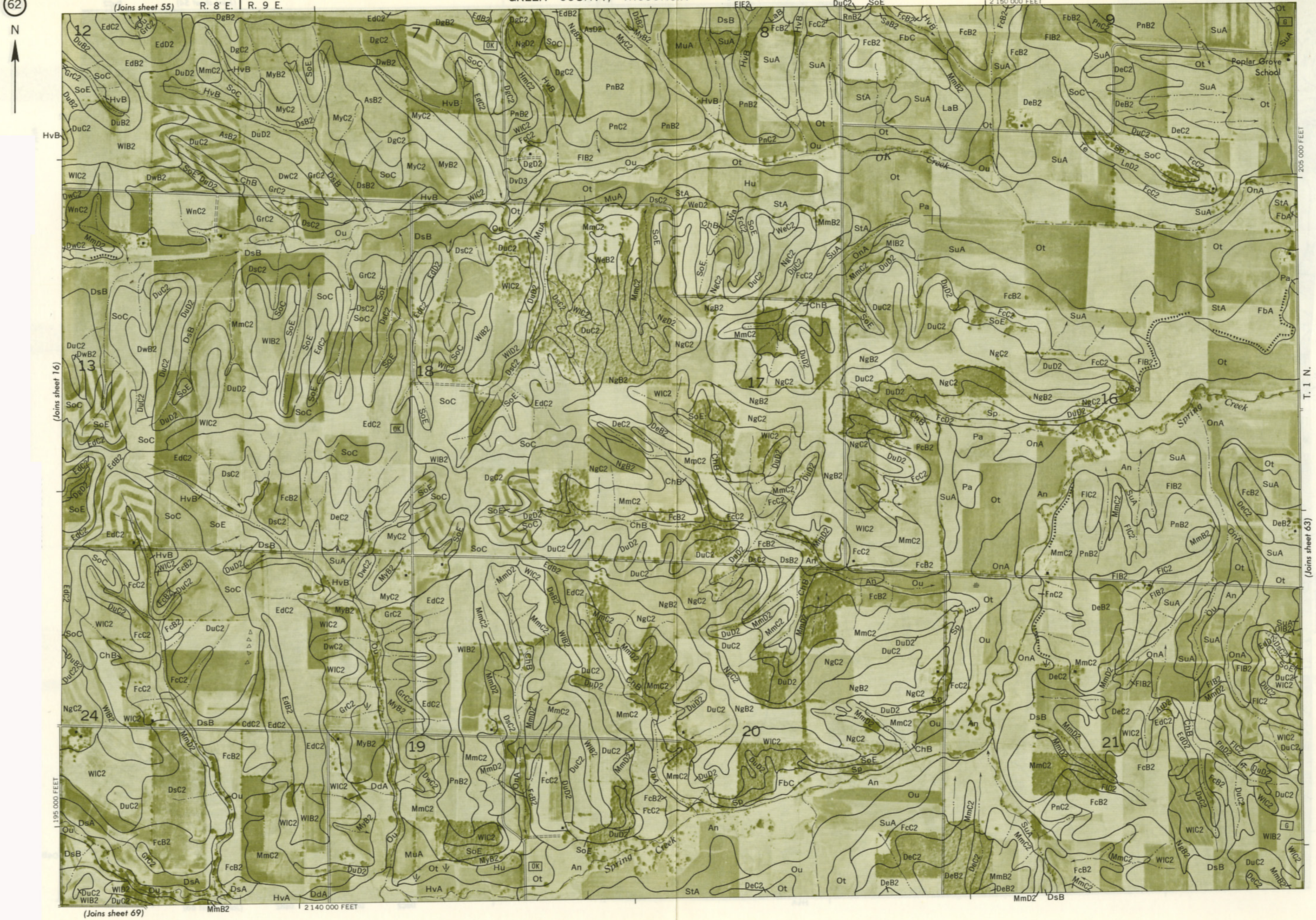

N
(Joins sheet 51)
(Joins sheet 57)
(Joins sheet 59)
(Joins sheet 65)
R. 6 E. | R. 7 E.
T. 1 N.
2 080 000 FEET
2 065 000 FEET
205 000 FEET
195 000 FEET
10
11
12
7
15
14
13
18
22
23
24
19
SAUCERMAN CEMETERY
Uflom School
Whitehead Creek
Honey Creek
Honey Creek

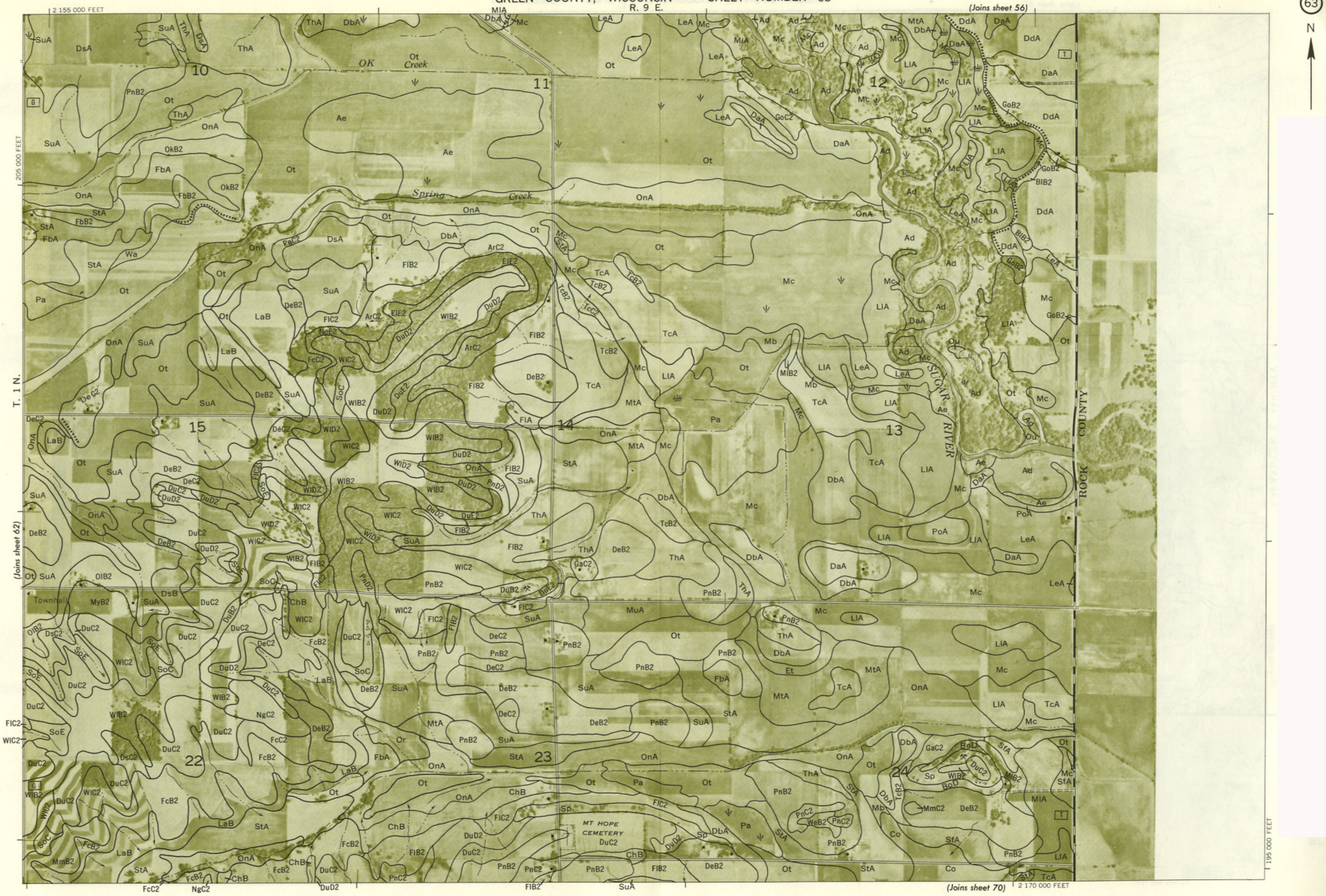
GREEN COUNTY, WISCONSIN — SHEET NUMBER 59

60

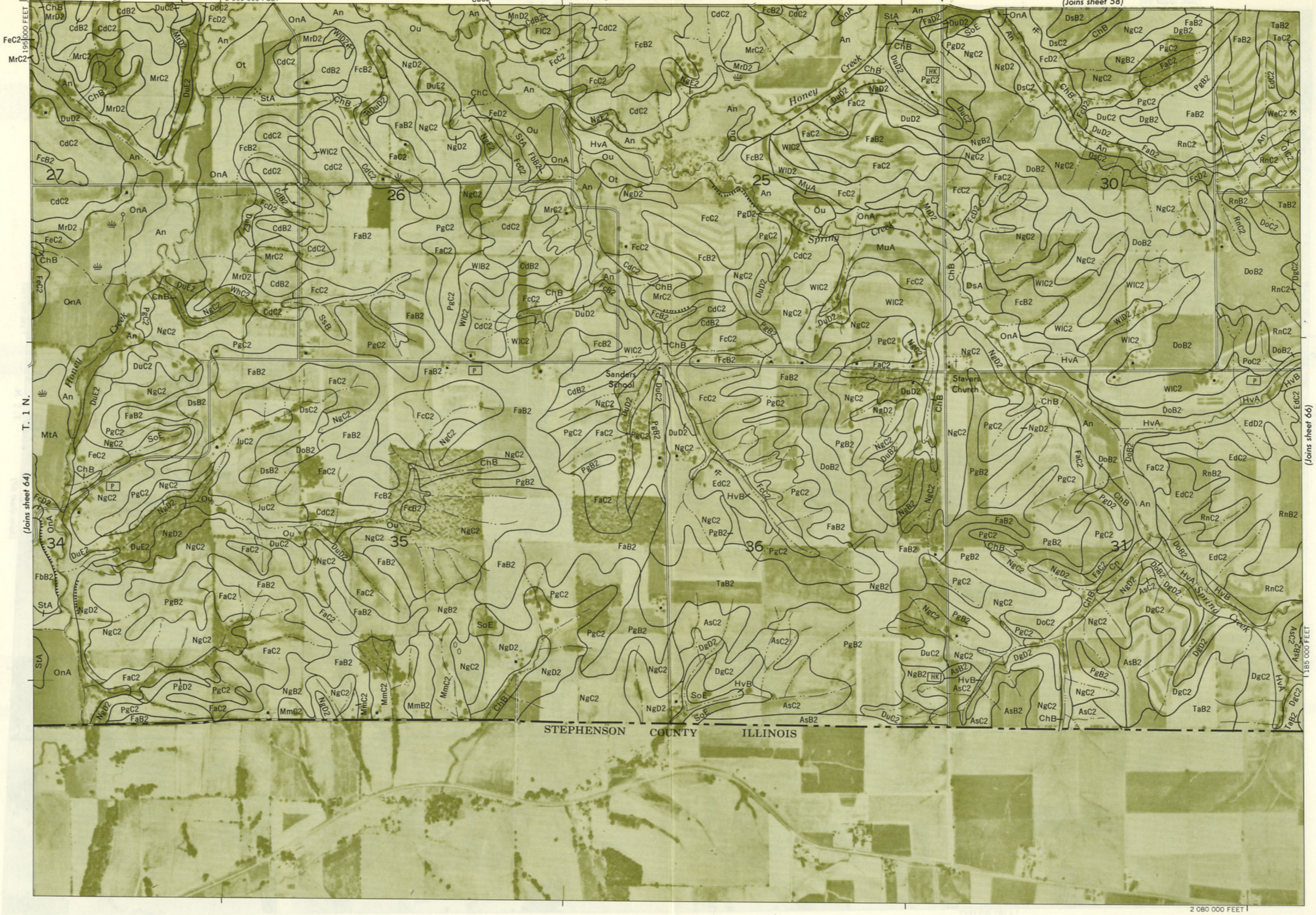
GREEN COUNTY, WISCONSIN — SHEET NUMBER 60


2 120 000 FEET
R. 8 E.
(Joins sheet 54)
205 000 FEET
T. 1 N.
(Joins sheet 60)
(Joins sheet 62)
195 000 FEET
(Joins sheet 68)
2 135 000 FEET
N
9
10
11
12
13
14
15
16
21
22
23
24
Twin Grove
Pleasant Grove School
Riley Branch


N
(Joins sheet 55)
R. 8 E. | R. 9 E.
2 150 000 FEET
205 000 FEET
(Joins sheet 16)
T. 1 N.
(Joins sheet 63)
195 000 FEET
2 140 000 FEET
(Joins sheet 69)
Poplar Grove School
Ok Creek
Spring Creek
Spring Creek

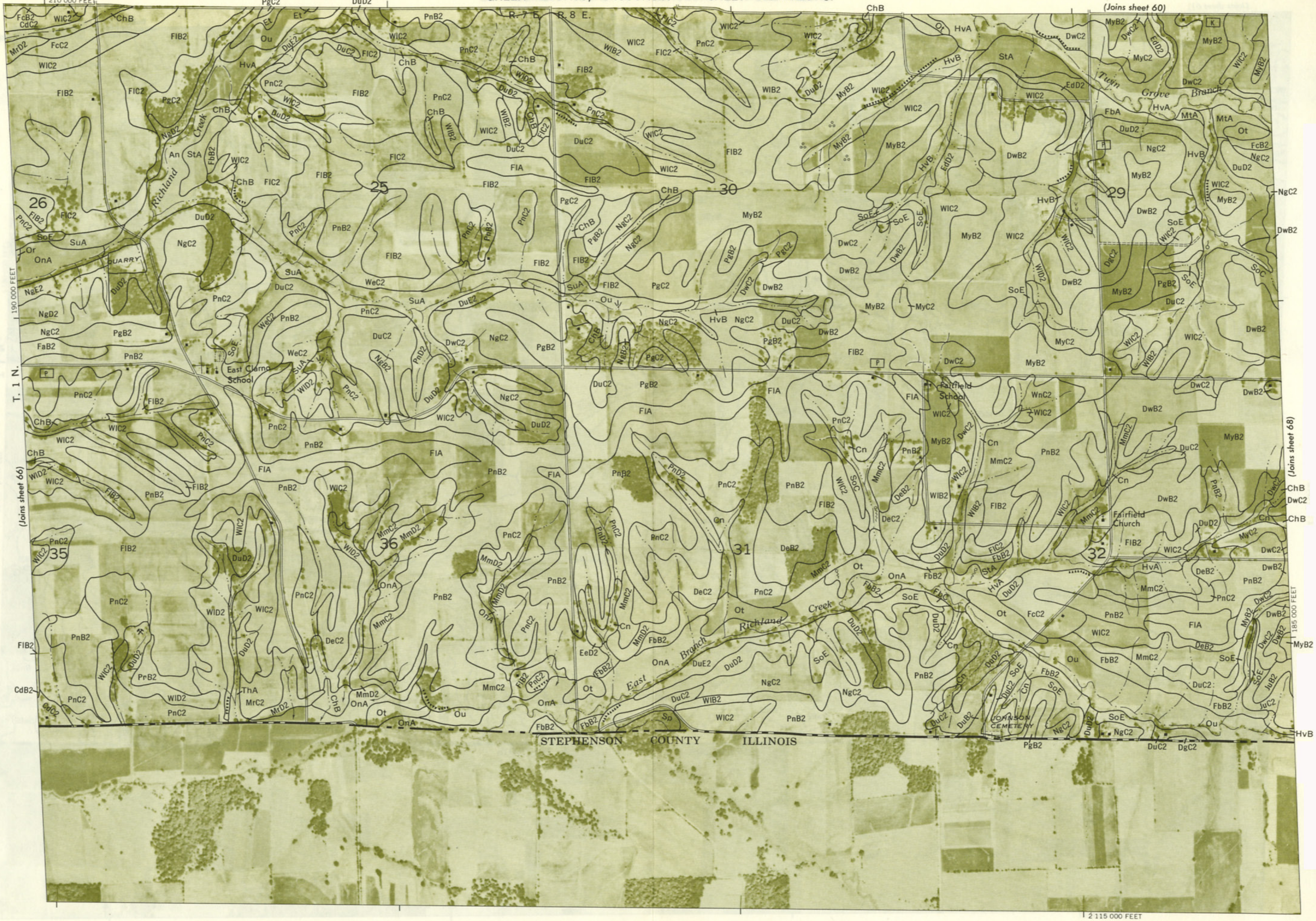

N
R. 9 E.
T. 1 N.
(Joins sheet 56)
(Joins sheet 62)
(Joins sheet 70)
2 155 000 FEET
2 170 000 FEET
205 000 FEET
195 000 FEET
OK Creek
Spring Creek
SUGAR RIVER
ROCK COUNTY
Townhall
MT HOPE CEMETERY
10
11
12
13
14
15
22
23
24

GREEN COUNTY, WISCONSIN — SHEET NUMBER 64


N
R. 6 E. | R. 7 E.
(Joins sheet 58)
(Joins sheet 64)
(Joins sheet 66)
T. 1 N.
2 065 000 FEET
2 080 000 FEET
195 000 FEET
185 000 FEET
27
26
25
30
34
35
36
31
Honey Creek
Spring Creek
Sanders School
Stavers Church
STEPHENSON COUNTY ILLINOIS

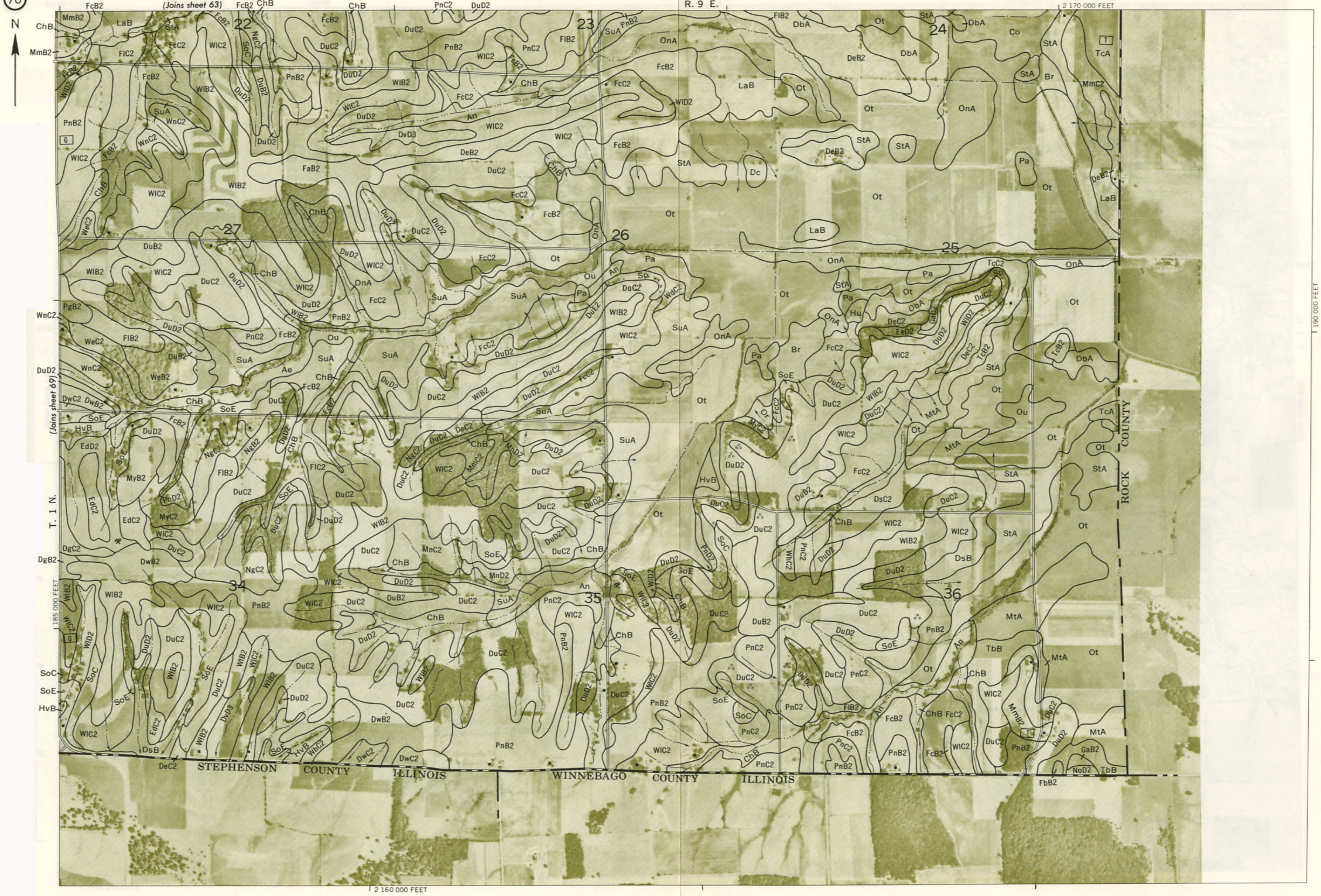

N
(Joins sheet 59)
R. 7 E.
2 095 000 FEET
(Joins sheet 65)
(Joins sheet 67)
T. 1 N.
190 000 FEET
185 000 FEET
2 085 000 FEET
28
27
26
29
33
34
35
32
Spring Creek School
West Clarno School
Clarno
Schueyville
Little Richland Creek
Richland Creek
Illinois Central
STEPHENSON COUNTY ILLINOIS

N


210 000 FEET
(Joins sheet 60)
R. 7 E. R. 8 E.
T. 1 N.
190 000 FEET
(Joins sheet 66)
(Joins sheet 68)
185 000 FEET
2 115 000 FEET
Richland Creek
Twin Grove Branch
East Branch Richland Creek
QUARRY
East Clarno School
Fairfield School
Fairfield Church
JOHNSON CEMETERY
STEPHENSON COUNTY ILLINOIS
25
26
29
30
31
32
35
36


N
(Joins sheet 61)
R. 8 E.
2 135 000 FEET
Twin Grove
Twin Grove Branch
Twin Grove School
28
27
26
25
33
34
35
36
190 000 FEET
T. 1 N.
(Joins sheet 69)
(Joins sheet 67)
185 000 FEET
STEPHENSON COUNTY ILLINOIS
2 120 000 FEET


R. 8 E. | R. 9 E.
2 140 000 FEET
(Joins sheet 62)
N
Spring Creek
Oakley Branch
Oakley
BASSWOOD CEMETERY
Union Church
Oakley School
QUARRY
GRAVEL PIT
T. 1 N.
190 000 FEET
(Joins sheet 68)
(Joins sheet 70)
185 000 FEET
25
30
29
28
36
31
32
33
STEPHENSON COUNTY ILLINOIS
2 155 000 FEET


N
(Joins sheet 63)
(Joins sheet 69)
R. 9 E.
T. 1 N.
2 170 000 FEET
190 000 FEET
185 000 FEET
2 160 000 FEET
22
23
24
25
26
27
34
35
36
ROCK COUNTY
STEPHENSON COUNTY ILLINOIS
WINNEBAGO COUNTY ILLINOIS